COLLEGE & RESEARCH LIBRARIES

NOVEMBER 1986
VOLUME 47
NUMBER 6

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C&RL

Guest Editorial

Faculty Client Files

A practice common to professionals who have direct interaction with individual clients is the maintenance of a file for each client. Physicians, dentists, accountants, architects, and psychoanalysts maintain client files. These begin with the first professional encounter and are updated with subsequent visits. The practice is so common that we rarely think of it except when someone loses our file or when we ask that it be forwarded to another professional.

Such practices extend to animals. An injured stray kitten will have a file opened by a veterinarian. The file will contain a record of observations about age, breed, general health, extent of injury, treatment, and advice to the prospective owner. The maintenance of the file is systematic, not dependent upon whim or whether there is a close friendship with the pet's owner. The veterinarian knows that excellent professional service is related to having full, up-to-date information at hand.

For the last fifty years, librarians have examined various aspects of the profession and contrasted its state of maturation with those of law and medicine. Through these analyses, much has been accomplished for librarians as well as for those we serve.

Academic librarians—judging by the literature on the subject of client contacts—are overlooking a splendid tool for the development of a close professional relationship with, and effective service to, the faculty of our institutions. A thoughtful, thorough examination of the applicability of client files to academic libraries illustrates that both librarian and faculty member would profit from the creation and maintenance of such files. The thrust of this editorial is that client files should be a routine ingredient in our faculty relationships.

How might the academic librarian develop a client file for each faculty member who is or ought to be professionally dependent on the librarian's bibliographic services?

An ideal cornerstone for the librarian's client file is the faculty member's vita. The vita is a personally prepared statement, normally current, which includes some mention of virtually every major aspect that is professionally important to the author. No single document is so readily accessible or offers a fuller introduction to the newly appointed associate or a better review of the longtime colleague. A file can therefore be easily opened for every faculty member served, regardless of the length of the working relationship.

The librarian's creativity will largely determine how many ways the vita information is used. For the sake of illustration, consider the newly appointed reference librarian. At a brief, introductory meeting with the faculty member, the new librarian obtains a vita and will surely find some element in it that will provide the basis for a follow-up meeting. For example, if the faculty member has published, the librarian might analyze the library's holdings of materials cited in his or her most recent publications. Should the library lack a significant portion of the materials cited, the librarian has discovered a topic of mutual importance.

In the second meeting the librarian will be able to convey a familiarity with the faculty member's recent work and an understanding of the collection. Such expertise and concern may form the foundation for a long, productive, professional relationship.

From this simple beginning, the librarian can expand the client file after every profes-

sional encounter, whether face-to-face, by telephone, or by mail. Following the discussion of collection lacunae, joint determination of necessary actions is recorded; later pertinent developments are entered as well.

Another singular opportunity to gather useful data is in a discussion of how faculty members involve the library in their instruction. Assignment sheets can be analyzed in a fashion similar to the citation examination mentioned above. Invariably there will be an occasion, with a majority of faculty, to follow up with an analysis of the library's ability to support their instructional efforts. Given the information explosion and proliferation of containers and sources, it will be a rare occurrence when the librarian cannot contribute professional expertise that assists faculty.

The faculty client file becomes an impetus for highly personalized service. A notation on the expected completion of a research project forms the basis for a review of research findings, the library's utility, and, especially, where the faculty member plans to turn next. After getting such information, the librarian may need to explore the collection, do literature searches, or inquire into other matters of significance to the faculty member. The audit trail of encounters and actions will assist the librarian in determining what steps to take next.

Through judicious use of the file, the librarian can develop services for the individual faculty member that are analogous to those provided by health maintenance organizations. From information contained in the file, the librarian has the basis for planning a customized program of information support. There will be little doubt about the content of conversations held, actions proposed and taken, and outcomes expected and observed.

For most librarians, the natural outcome of maintaining faculty client files will be more frequent, systematic faculty contact, greater effectiveness in support of our colleagues, and thus a more significant role in the academy. Even a modest investment in these files will yield valuable results.

There is yet another major benefit. The librarian's successor will begin work with a store of professional information that can be put to immediate use. To begin where one's predecessor left off is far better than beginning at random.

To summarize: the purpose of the faculty client file is to document the interaction between librarian and faculty member and to provide a record of the faculty member's information needs. The file can be an important communication tool between librarians as well: its contents should facilitate research, evaluation of services, and administrative planning.

Given the central function of client files in other professions, and given the potential benefit to librarians and to those faculty we serve, what now deters us from incorporating this near-universal practice into our faculty liaison work?

CALVIN BOYER
University Librarian,
University of California–Irvine

IN FORTHCOMING ISSUES OF
COLLEGE & RESEARCH LIBRARIES

The Electronic Campus: The Impact of the Scholar's Work Station Project on the Libraries at Brown
by Barbara B. Moran, Thomas T. Suprenant, and Merrily E. Taylor

Pay Equity in Academic Libraries: An Analysis of ARL Salary Surveys, 1976/77–1983/84
by Jean Meyer, Ray and Angela Battaglia Rubin

Library Skills, Critical Thinking, and the Teacher Training Curriculum
by Nancyanne O'Hanlon

Open Systems for Open Minds: Building the Library without Walls

John R. Sack

As scholars are more frequently connected to electronic networks allowing access to research information and collegial interchange, the roles of the library and the computer center will need to shift from those of a central repository holding information and technology to that of sleuths and integrators of disparate information sources. The malleability of electronic information, the openness of systems containing it, and the expectations of scholars as they become less "patrons" of the library and more "users" of electronic information services will drive us to develop systems and organizations that readily facilitate the transmission and transformation of knowledge.

To sharpen the point of my topic, I will begin by asking this question: *when, how, and by whose hand will libraries disappear?* There are several ways in which libraries might disappear, not all of them bad, and I suspect that many in RLG libraries are actively working on effecting the disappearance.

Of course, the most obvious way libraries might disappear is through disuse, that is, through a shift of scholarly research away from libraries towards other places and other media. According to this scenario, libraries might disappear because they lack significance in the academic program—because they are not essential. Many campus organizations are vulnerable in this way: one might suggest intercollegiate athletics; another might suggest government or faculty committees.

But a second way libraries might disappear is not so frightening: the library might disappear simply because it blended so successfully into the background of a scholar's activity that the scholar never needed to regard it explicitly as a place to go, or an interruption in an ideally seamless activity of research and reference. According to this second scenario, using a library becomes so effortless and natural an activity that scholars no longer have to think of it as a special (and time-consuming) component of their research. Thus, libraries disappear because they become invisible and because their location is wherever you are: "without walls," if you will. More than a physical location, the library becomes a medium or ubiquitous utility, a service always ready at hand. Perhaps an example of such is the telephone or television.

My last variation on library absconditus is a challenging one: the library may disappear by becoming something so different that patrons are tempted to call it by another name, as they treat it less as a storehouse than as a vehicle or conduit or service. If Wittgenstein is right, when this

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happens we'll notice it by the way scholars begin speaking about libraries. Perhaps *library* will become an odd sort of verb (e.g., I *libraried* that topic and found new approaches) much as *telephone* became a verb soon after it was established as a noun. What I have in mind is an extension in the scope of what *library* connotes, a change as substantial as the change from portraiture to photography. The important factor is not extension so much as *extensibility*, in which the ability to change becomes fundamental to the medium. The new library might differ from the old one the way a television differs from a window.

By whose hand will libraries disappear? This question involves the control of destiny: the disappearance can come about at the libraries' direction or by the scholars' defection. Let me also assure you that similar questions of destiny weigh on the technological professions, where there is far less of a ballast of tradition to rely on for safety. In fact the most fruitful transformation for each of these professions will come with the assistance of the other.

EXPANDING THE VIEW OF LIBRARIES AND COMPUTER CENTERS

Let me suggest some elements of a critique that would encompass libraries and computer centers at the same time.

Both libraries and computer centers have "high visibility" to scholars; they are modest hurdles, with immodest potential. Both institutions are hard to use, distant, rule-bound, inflexible; they aren't readily assimilated for the scholar's work-space and -time. Both sometimes appear to be devoted to a "divide and complicate" philosophy when the best scholarship tries to integrate and unify.

The value of the library and the value of the computer seem to increase for the scholar as their nuisance factor—the interruption of a line of inquiry to deal with the opacity of a foreign place, culture, and procedures—disappears. That is, as each institution becomes more malleable, open and translucent, it becomes more able to shape itself to the scholar, becoming less a specific place than a service and a near-transparent medium. The tool can then be tailored the way one has a suit tailored, or the way one arranges an office. The key to achieving this malleability and placelessness is technology that can be shaped by imagination.

The plight of libraries and of computer centers a decade or two ago was that they provided very small windows on a very large world. If one's view of the world were limited to what one could see out the window of one's home (particularly in downtown Palo Alto), then that view would be very limited indeed; the panoramic extensions to this view have come from technologies that let people be where they were not, such as the telephone and television. The telephone-answering machine and the videocassette recorder even let these technologies act as our *agents* when we are not present, shifting time as other media shift space. While we may have personal antipathy for these technologies, their unique effects on information access and distribution are undeniable.

Libraries and computer centers have taken steps to enlarge their windows, in a sense. They have both connected themselves to networks, for example. But they have not really taken the steps to shift from windows to television, if you will. The current networks are still very limited, rather like TV with only three broadcast channels.

Just as there is vastly more information available on television than there is out the window, there is vastly more information available to the fully networked scholar than in the utility-connected library. And yet the profession's capacity to handle information has been increased only by adding more people as specialists in new or growing areas, rather than adopting a new strategy. The current strategy may not be sufficient to keep pace with arithmetic growth in information and access; it certainly isn't sufficient to handle exponential growth in the number of information providers and the amount of information accessible to individuals. We are, in a sense, running along as if we simply had to flap our arms harder to take to the air.

New approaches are needed, and a novel one has been suggested by Alan Kay, now an Apple Fellow, and inventor

of the "dynabook" concept when he was at Xerox Palo Alto Research Center (PARC). When Kay was at Atari he built a working model of a semiintelligent process, called an *agent*, which would scan various electronic news services at night and build a custom newspaper for you, based on its knowledge of what you would be interested in. Thus the headline might be that U.S. planes were bombing El Salvador or it might just as well be that your afternoon appointment was cancelled (which the agent learned by reading your electronic mail). Kay is now studying how one imprints agents with a character that allows them to recognize information of value to particular individuals.

Society already has many models for such agents. The stock broker and real estate agent come readily to mind, and even the private eye is functionally similar. And SDI (selective dissemination of information) searches are a primitive, automated example from our own profession. At Stanford, as part of a project to study electronic communication of research materials (Project Concourse), we will be allowing faculty and students to "characterize" agents that will examine bibliographic and nonbibliographic databases and bulletin boards, retrieving new items of personal interest and placing them in electronic mail boxes.

THE CAPACITIES OF THE RESEARCH LIBRARY

The possibility that the library will disappear for the research scholar is also suggested by the Newman Report on Higher-Education Policy commissioned for the Carnegie Foundation for the Advancement of Teaching. The report states flatly that "the research community is moving beyond the capacity of the research library" (*Chronicle of Higher Education*, Sept. 18, 1985, p.17–29). Indeed the report's section on research libraries is worth a brief review here, since it argues that our patrons have supplanted the libraries—appropriately or not—by means of outside technologies and services available to them.

The Newman report argues the need to find ways of defining the function of the library. Because of the cost of materials, interlibrary cooperation will clearly be necessary to provide researchers with the products of the "knowledge explosion." But by itself membership in a network will not be enough—not even membership in several networks. The fact is that despite patron confusion about widespread electronic information, use of the upcoming tools will be easy enough to allow each person to be his or her own librarian. What is more, many of us believe electronic access will be the way out of the paradox that some materials are needed infrequently but needed urgently and quickly when they *are* needed. Still there are several interesting problems with electronic access that the report emphasizes:

- You first need to know where to look in order to find what you're looking for; this clearly penalizes patrons working outside their "home" discipline, for which they presumably know standard bibliographic sources and practices.
- The refereeing and public criticism found among printed works is not part of the electronic journal article.
- It is hard to establish an orderly historical record online.
- Funding problems arise because the library traditionally discriminates in favor of *acquired* as opposed to *accessed* material. Funding discriminates in favor of the haves as opposed to the have-nots.

The last particularly affects librarians managing collection development and/or public service functions. For traditional acquired materials, the charge is levied only when the library gains ownership; but for electronic media, the charge is levied when one gains access.

The Newman report suggests that electronic access will require a shift in library service outlook from "owning to sleuthing." (This electronic access should not be confused with automation of technical processing, of course.) The role of the sleuth "requires an educational and emotional [philosophical] commitment to the shift in outlook required to change from owning, cataloguing, and lending, to becoming electronic data sleuths ready to link a student or faculty member to someone else's data bank." The Newman report's section on research libraries ends by calling for something with the unfortu-

nate name of "Scholarship Information Systems." In any case, whatever the name, this transformation would fit my third notion of the disappearance of the library (qua warehouse) and the emergence of the library as the integrator of information.

To begin this shift of emphasis, library staff will need many of the same tools that have started their faculty colleagues down the path of electronic access. Many researchers, for example, among science and engineering disciplines, frequently communicate electronically with their colleagues, sharing text, experimental results, citations, and abstracts. The tools that have allowed some scientists to move away from the library are the same tools to which library staff need ready access.

LOCAL AND REMOTE IN DECENTRALIZED INFORMATION NETWORKS

I'd like to suggest a simple conceptual model that shows the topology of research information from the library's and the scholar's point of view. Let me call these the Ptolemaic and Copernican views (see figure 1: of course the library has to deal with thousands of scholars, and the diagram simplifies the effect by showing only one).

I suspect that, in the scholar's view, the transformation of the library from the Ptolemaic to the Copernican view is already an established fact. The library's adaptation to this transformation is not as well established; neither is the computer center's. Again, we may look at our own language as an indication of our attitudes: we refer to the extra library patrons as "remote users." But from the patron's point of view it is the physical library that is remote from his or her workplace. Similarly, in computer centers five years ago a printer was *local* if it was physically housed with the computer and *remote* it if was at a user's site. The opposite is now the case when we say those words: users now have *local* printers in their offices and think of the large printers at the computer center as *remote*.

The library is a node in the scholar's information web. But the library must take into account the scholar's entire research process and the variety of his or her sources and resources. The library must then comport itself as if it were a responsi-

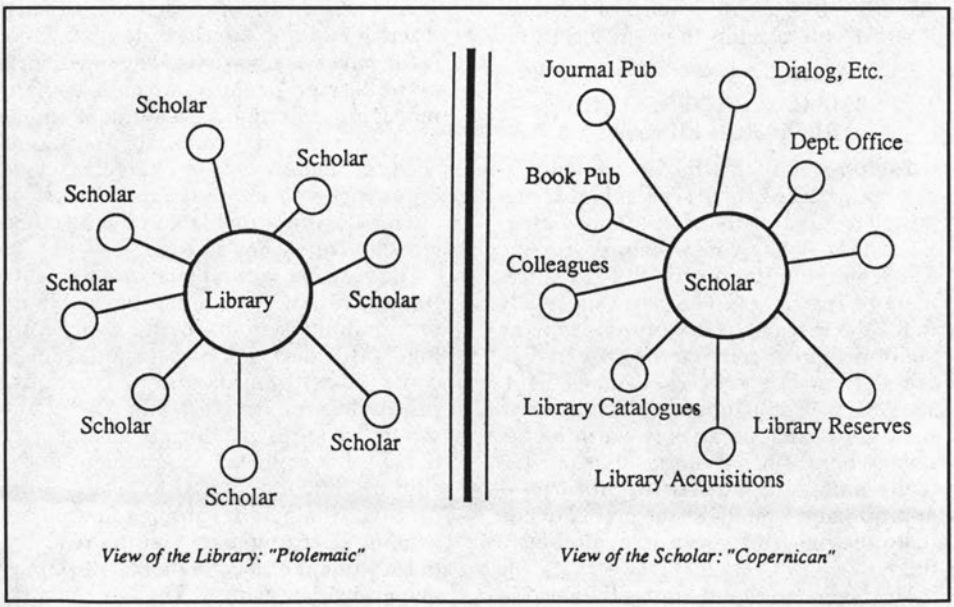


FIGURE 1

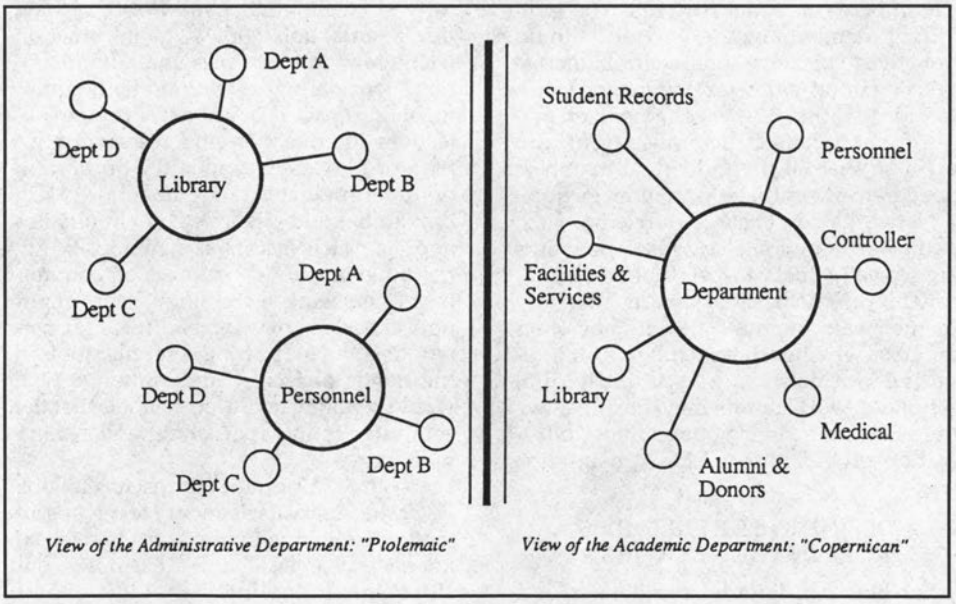
ble member of the scholar's "information society." It must develop strong relationships with other information units in and out of the university. The scholar is surrounded by the resources of this society, some of which are facilitated by (not necessarily all "held by") the library.

At Stanford about two years ago we came up with a similar critique of administrative computing architecture (see figure 2). The analogy is not exact but the point is to identify the appropriate "center" for a service system and then to tailor the services to fit the entity at the center. In administrative computing, the center should be the individual department with its comprehensive service needs; in research, the center is of course the individual scholar.

Perhaps it is easier to spot the philosophical transition when the shoe is being worn on the university's other foot. Those who have had university management responsibilities can probably see that in the older architecture the burden of integration of information falls squarely on the smaller unit, with the least talent and expertise to handle it, instead of being shouldered by the larger organizations. The integration must be performed hundreds of times, being reinvented in each department.

Scholars participate in many different information networks. In some of them the scholar acts as correspondent, in some as passive recipient, and in some as creator or initiator. The intersection of these many networks would be too complex to draw, but you can readily imagine what it would be like: perhaps like a galaxy of solar systems. The drawing would quickly lose any sense of a center even if you tried to draw only a few scholars and a few information providers (which might, of course, be other scholars). Rather than showing one center node intersecting with many lesser nodes or "satellites," the drawing would have to depict many equal units sharing information on an equal basis.

Computer networks are ideally decentralized in the same manner as scholarship networks. And I am not using networks merely as a metaphor: here the medium is truly the message. A network, for example, is not centered on the warehouse of the mainframe, but on the medium or service of the wire. Figure 3 shows informa-



View of the Administrative Department: "Ptolemaic"

View of the Academic Department: "Copernican"

FIGURE 2

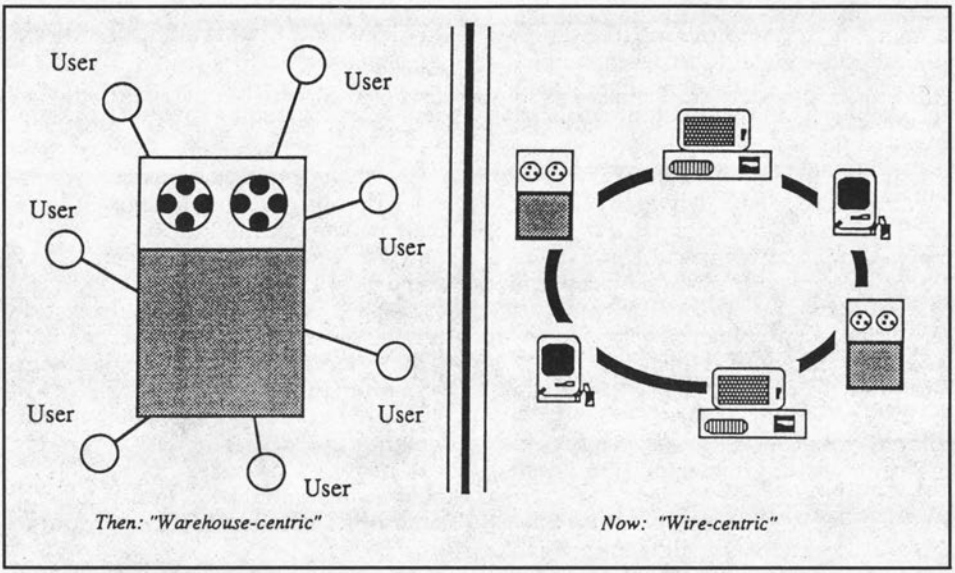


FIGURE 3

tion exchange as it was before and after local computing and networks provided individuals and organizations with direct access to each other as providers and users.

The focus is on exchange, on communication between equal partners. The individual members of the network should not have to perceive some central unit dispensing information (or obstructing information); rather the mechanism or medium should itself be transparent and open so that all the individual members need perceive is the information itself.

Networks don't *own* resources so much as make them *accessible.* Also, networks are typically "peer-to-peer" in the jargon, not hierarchical. This means that any member can communicate with any other member whether that member is an individual or institution. An individual scholar's workstation may ideally have the same access to major and minor information providers that RLG's mainframe has.

DEFINING THE LIBRARY'S ROLE IN THE NETWORKS

But how can libraries facilitate such a network, and how can they understand and prepare for their own part in the scheme? Two complementary suggestions come to mind.

First, one can look *outside* the library to see where the university nonlibrary information society is tending over the next forty-eight months. Look at both "data flows" and "dollar flows" for information technology in academics and administration, considering in addition both equipment and space. Look at new program objectives in education and research (e.g., Stanford hopes to double the proportion of undergraduates doing honors work in humanities and science). One should also appraise such factors as new faculty appointments and title changes on committees overseeing technology. One might note especially new expenditures for networking and for putting computer tools in the hands of faculty and students. One would certainly take a look at tools that the computer center is teaching and recommending.

A second important approach is to look *inside* the library itself and try to refocus attention for a time on *access to information,* not *material acquisition.* For example, consider the following "thought-experiment": imagine that library staff had only

a micro, a communications line, and a phone, but no building or collection. What sort of services would they offer in order to provide real added value with such minimal tools? One might also consider access in smaller research-oriented branch libraries; the staff in such branches often seem to understand intuitively the library's place in the network of research information communication, when it is situated as one "service station" among many in a department or school.

Perhaps the library should take on more responsibility for providing access to information that it does not possess, order, and control; more and more research information will be of this sort. This parallels the transformation from the library being an owner of books to its being an "integrator of systems." The former is a limited and technical function, while the latter provides a professional service function well into the future. The "integrator" is just another version of the "agent" I described earlier. (A senior Stanford librarian has told me of the problem in definition of the library profession; because technology has been having such a large impact, many librarians feel the future lies in becoming "technologists" in order to be able to build better systems. But there will always be systems of information for the scholar to use outside any one library or field, and this is why the role of the integrator of such systems may be the professional high-ground.)

When a library does buy or build systems, it should make sure the system provides the most general software and hardware possible. This facilitates the system's participation in the networks that scholars are already and will be using. One should assume that extra-library use of library systems will be equivalent in volume to in-library use over the next decade, and that extra-library use will replace only a small part of library use, especially when the system describes materials that are not inside the library. A library ought not to buy anything that can't connect to a network unless it can afford to dispose of the equipment quickly rather than amortize its purchase price over several years.

The library staff should have access to the same tools that faculty and students are using for electronic access. This will usually mean personal computers, modems, and access to campus electronic mail systems.

EXPECTATIONS OF PATRONS AND USERS

What are the needs and expectations of such "remote" and networked users? Almost all the special needs I can identify can be derived from a basic proposition: the scholar is more a computer "user" than a library "patron." His or her expectations will be derived largely from the culture of computer access and manipulation of information, not from library access to information. This attitude will arise if only because the user is not physically present in the library.

For example, the current "online strategy" patrons use with the online catalog in the library is largely a substitute for that used with the card catalog; the catalog (online or not) is seen as a locator or pointer to materials on a nearby shelf. But outside the library the catalog undergoes a metamorphosis into a research tool in its own right.

For Stanford's online catalog, Socrates, one can compare patron suggestions that come from library terminals with those coming from users in their home, dorm or office: the latter often request nonlibrary information and services. (There are about twelve hundred patrons with access to Socrates outside the Stanford University Libraries. Their use runs to about one thousand sessions per month.) For instance, we've frequently been asked why article abstracts aren't available to Socrates users. We were even asked how to look up monetary exchange rates in Socrates. (We replied to the last suggestion that an on-campus travel agent and bank were good sources of information.) Incidentally, we noted that one community of test users who had problems with the early version of Socrates were computer science professors. They found that Socrates' natural bent was to support a card catalog–style search strategy, and they wanted to manipulate it like any other set of databases they would use in their own work. (Later

versions of Socrates allow this "database" search strategy with greater flexibility.)

The point of these anecdotes is that Socrates is already expected to be or perceived by its extra-library users as the integrator of diverse systems of information. This is partly due to a "critical mass" phenomenon in which any large and seemingly comprehensive source of information is expected to absorb subjects that are on the fringes of its mission: the size and sophistication of a medium attracts the attention of information users and providers who become progressively more interested (and demanding) as the size increases. The interest of users increases as the investment of suppliers increases, and vice versa; and more use breeds even more use.

The shift in expectations from those of the "patron" to those of the "user" is of course gradual and stratified. It will presumably happen first in disciplines whose primary sources are already online. The computer science discipline was the first to shift; physics and engineering have largely done so by now. These cultures and others now have many of their secondary sources online (e.g., works of scholarship including bibliographic and numeric databases, largely because of the critical need for timeliness in some fields). The shift will also come earliest in those disciplines, such as education and librarianship, where electronic access is itself an object of study, or as with many undergraduate students, an object of pleasure or recreation. It will spread to some degree to most disciplines, no matter how "paper-oriented" a discipline may seem at the present moment.

Incidentally, many scholars are going to expect some things to carry over from the "patron" culture. Undoubtedly many will expect these new forms of electronic access to be free of charge to the individual (as Socrates is at Stanford now). Certainly this expectation will be weaker for services available outside the library.

I will note some of the characteristics of the "online culture," and I think we should particularly consider the points that run orthogonal to current and traditional library procedures and/or patron culture. The theme connecting most of them is increased *immediacy of access.*

- Users focus on results, not procedures; the computer user usually doesn't care about how or why something is done (the "hacker" mentality is an extreme example of this).
- Users demand speed, not deliberation. The computer user will often have chosen the computer because of its ability to provide instant results; spreadsheets and electronic mail are examples here. Users are impatient with any process that leaves their minds idle while they wait for something external to catch up.
- A corollary to the above: most users prefer a fast but incomplete answer to a late and encyclopedic response. The scholar usually needs completeness eventually (particularly in central research areas); but in the short term a single citation may be enough to supply a missing fact or direct a search further; the user, of course, wants to make the final judgment of sufficiency/adequacy versus completeness.
- Users demand two-way communication, rather than passive acceptance of whatever comes down the wire. In Socrates, we receive between five and ten communications ("suggests") a day from users. We answer any suggestion that is signed, and this sometimes leads to a dialogue on a specific issue. Frequently we receive acquisition suggestions, rush processing requests, and, on occasion, a reference question; we've even received compliments about staff and complaints about bats and bathrooms—suggesting that this is an alternative communication tool for some. We respond as quickly as possible (sometimes within a few minutes) and use electronic mail whenever possible; two-way communication allows the human aspect of a service to be perceived, and reduces the isolation of "remote" users (who are perceived as remote by the library but naturally not by themselves). Such service must be responsive and quick, if it is to be perceived as helpful at all.

The remaining expectations worth noting derive from the principle practiced by

many software and hardware vendors who realize that, to survive, their systems must connect with other systems. This is the general principle of "open" systems architecture, which finds specific expression in the ISO/OSI system interconnection standards, the MARC data interchange standard and even the Macintosh clipboard. Fulfilling such expectations is easiest with the use of general-purpose hardware and software, particularly with respect to user interaction ("interface") and capabilities and data and network communications.

- Users expect you to provide a relatively seamless integration of your system with whatever other systems they use. You must understand what other information systems scholars use and how those systems might influence expectations for your system. At Stanford, Socrates users frequently send citations to colleagues via electronic mail or incorporate citations into mainframe and microcomputer documents and databases.
- Users expect electronic information to be malleable, and expect the library's system to be flexible. They judge what computers can do from their own experience with personal and departmental computers. So, for example, they will expect to be able to reformat citations to meet various publications' style requirements. After all, it is not the transmission, but the transformation of knowledge that occupies the attention of most scholars.
- Users expect the library and its system to be ready to change to meet the expanded potential of electronic catalogs over manual ones. As one example, the office responsible for facilitating the use of Stanford facilities by the disabled asked us to enhance Socrates displays so that blind students can more conveniently search and display records via a voice-output unit that is already familiar to them from other contexts.
- Users have little sense of library tradition and will not readily make a distinction between owned-by-library and nonowned information, or between traditional library materials and those not typically managed by libraries. In commenting on this, one scholar remarked that his primary need was for a research tool, not an inventory system. It is sometimes more important to know of an item's existence than to know whether the library owns it or not. Interlibrary loan has to some extent made "not owned by library" just another citation status; the library already fills the "integrator" role here on a special-request basis.

The principles of openness, interconnection, and extensibility were so important to the design of Socrates that more than half of the desiderata developed by the design team support them. I'll note those items that directly reflect the principles:

- The system must be accessible from any terminal device at any speed.
- The system must be accessible from every campus network and beyond.
- The system must support more than two hundred simultaneous users.
- The system must provide the base for MARC and non-MARC data files, and for library and nonlibrary services and functions.
- The system must provide for two-way communication between staff and patrons.
- The system must be available twenty-four hours a day, seven days a week. Scheduled downtime is never acceptable.
- The system must suggest to the user that it is not solely an online version of the card catalog by providing noncatalog services.
- The system must be adaptable to use on microcomputers and electronic mail networks and must support formatted file transfer.
- The user must not need any documentation except what appears on the screen.

Other expectations will develop as the library meets current ones. I think one way to anticipate some of these is to observe what today seem to be some of the more atypical or advanced uses of library information. Such uses can show how people define information by showing

what they do with it. I will mention a few from Stanford:

- One of Stanford's foremost researchers in artificial intelligence frequently appends bibliographies derived from Socrates to notices he posts on electronic bulletin boards. The latest was a "flame" (electronic mail heatedly expressing an opinion) on South Africa.
- A graduate student regularly searches Socrates before he attends a lecture by a visiting scholar to see what the lecturer has written. Another student looks up additional works by authors cited in journal articles as she reads at home.
- Members of a fraternity that was already on probation for sexism began electronically sending Socrates citations on risqué topics to other individuals, not realizing that the sender's name was displayed to the recipient.
- An M.B.A. student reinvented copy cataloging when she started a project of using Socrates citations to index her personal library.
- A radio announcer uses Socrates to find unusual works to play on his program.
- The student newspaper carried an article entitled "Socrates Could Teach Them a Thing or Two at MIT," indicating students' pride of ownership in the system.
- Frequently the first search a faculty member does outside the library is to check that the library has acquired all of his or her work.
- Several people have described "doing random searches for fun" and using Socrates for "fishing expeditions" and "whimsical browsing."
- A student show this year features a skit in which the founders of the university get lost inside a Socrates terminal.
- A staff member sent us a somber authority correction noting her father's recent death and asking that it be recorded in the main entry for works he authored.
- It has been suggested that Socrates should "contain everything," but most people would settle for retrieval of journal articles, complete retrospective conversion, and access to other libraries' holdings (UC Berkeley and LC are mentioned most often).
- One person suggested that Socrates note which items were available for purchase in the bookstore and another suggested online ordering of pizza.

Perhaps the most pleasing report from a user was that "Socrates was the biggest library improvement since open stacks." That comment certainly puts "openness" and access in perspective.

A PARADOX FOR PROFESSIONALS

I began this paper with something of a paradox, talking about building the library without walls—an open system readily facilitating transmission and transformation of knowledge.

The real revolution, if there is one, is not so much in the amount of information available but in the way individuals will adapt to this wealth using technological tools. That this technology will have an effect as lasting as Gutenberg's technology is a commonplace, but I have chosen to focus on the malleability of electronic information and the increasing openness of systems containing it as the distinctive characteristics to watch and respond to. These characteristics combine to encourage the spread of information and ideas beyond the capacity or control—for better or for worse—of information specialists.

If ready access to and demand for great quantities of information by individuals defines the next decade, then those of us in the information professions should define ourselves in a positive relationship to the trend—as agents, as sleuths, as integrators of systems. Avoiding for ourselves the fate of our own card catalogs, we will find that sharing information, not merely holding it, is the key to our own future.

Libraries as Life-Systems: Information, Entropy, and Coevolution on Campus

Timothy C. Weiskel

Just as the study of natural life-forms has benefited from the insights of ecologists, so too our understanding of the university library and its future evolution can be enriched by studying the changing ecology of information flow on campus. The introduction of new technologies for generating, storing, and transmitting information will radically alter the character, magnitude, and direction of information flow on campus in the years to come, just as these things are likely to shift in our society at large. In response to these evolving technologies, major institutional changes can be anticipated. As the group primarily concerned with designing the environments for storing and recalling these new types of information, university librarians need to be attentive to the delicate intellectual life-forms that may well be extinguished by massive or pervasive shifts in the library environment. Their choices need to be wise, kind, and careful.

Libraries, as we have come to know them, are an endangered species, and they may well become extinct. This is so not because they are operated by dinosaurs, mastodons, and saber-toothed tigers, nor because they serve wooly mammoths, giant sloths, and dodo birds, but rather because, like the vulnerable carrier pigeon, they are a life-form that coevolved with mankind to meet specific needs during a phase of its social development. As human information needs change radically in an altered information environment, so too will the life-forms that will coevolve to meet these needs.

PROCESS AND FORM IN LIFE-SYSTEMS

Process, perhaps even more than form, constitutes the defining characteristic of life-systems. We know something to be what it is because it does what it does. Yet we need to guard against some conceptual mistakes here. The commonsense contrasts between structure and function, morphology and physiology, form and process are not ultimately defensible when life-systems are viewed over time. At any one moment it may be true that form, morphology, and structure all contain process, physiology, and function, but in the long run the former attributes express the latter. Form is the residue of process.

A careful study of a termite hill reveals the nature of relations between its former living inhabitants. The termite hill is clearly an object, but it is best understood as what archaeologists call a "processual object"—that is, an artifact whose structure reveals something about the process of its creation as well as its reason for existence. The intention behind examining things in this manner is to "read" processual objects for information about the

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processes they were designed to facilitate.

Only in this manner can we come to understand why some life-forms have become extinct. It seems that extinction tends to occur when the processes that characterize life-systems change more rapidly than the structures that contain them. At that point either the structures themselves change or, more frequently, they fail to reproduce effectively, and other structures take their place as the vehicles of life process. The transformation or transition from one structure to another is itself a kind of "metaprocess" of evolution. As processes of information-flow change on campus, university structures also change. In this fashion we are eyewitnesses to the evolution of life-forms.

THE LIBRARY AS A PROCESSUAL OBJECT

All of this is familiar enough to any student of natural history, but when we begin to "read the library" as a processual object in this manner, some interesting phenomena come into focus for us as scholars and librarians. As a first step we need to look beyond the objects so familiar to us in this environment and examine instead the processes these objects are supposed to embody or facilitate. Let us begin with some commonsense definitions of the library and see where this kind of approach will lead.

If you ask most freshmen *"what is the library?"* the response is likely to be something on the order of *"the place where they keep the books, dummy."* This is a true but trivial definition, for clearly it is much more. By sophomore year, most students have discovered that there are a lot of other kinds of documents in the library. Maps, sound recordings, microfilms, newspapers, coin collections, postcards, private papers, etc. are all now considered to be part of the research library's appropriate inventory. To be accurate, then, the definition of a library has to expand considerably beyond a freshman's understanding. One provisional definition could be

A library is any institution that contains consultable documents.

This definition is at least a little more polite than the utterance of our freshman, but it still betrays our object-oriented parochialism. We have not yet come to focus on process. Instead we have merely expanded the notion of "the book" into that of "the document." Let us turn for a moment, then, to look at the series of processes embedded in the notion of consulting a document.

As we focus upon process it becomes clear that the scholar's concern is not primarily with books or documents as artifacts, even though personally he or she may be a bibliophile or a closet archivist. The absurdity of the following imaginary conversation makes this clear:

Bookseller: Do you want to buy a book?
Scholar: No thanks. I already have a book.

A scholar might say this about a car or a loaf of bread, but not about a book or a document, because it is not these things as artifacts that interest him in the first place. Instead, in his research capacity the scholar considers documents as precious vehicles of information that provide windows upon the thought process and life conditions of other human beings. Any document or book is a communication device or channel, characterized by its capacity to store and "carry" encoded information. Conversely, any vehicle or carrier of encoded information constitutes a kind of document.

This requires some elaboration, and concepts developed in information theory and thermodynamics may be helpful in providing some simple definitions that reveal the fundamentals of the processes we are trying to examine. According to information theorists, information is any nonrandom arrangement of matter or energy. By contrast, the random arrangement of matter or energy is maximum entropy. Information is its opposite. Information is thus, "negative entropy" or "negentropy." It is not the same as matter or energy, but differential states of matter or energy can convey it. It is not itself a "thing" but rather a relation between "things" or states of energy over time.

In this sense information is preeminently involved with process and movement, for it can only be said to exist as a manifestation of differential states of mat-

ter or energy, that is to say, a variation of these things from their most probable arrangement—absolute randomness. Information may seem to be stable and nonvariant, but as the second law of thermodynamics suggests, such stability is illusory. Any discernable arrangement of matter-energy that is not random is but a stage in the process of becoming so. All structure is becoming unstructured.

This fact, though universal in nature, smacks the academic community in the face in a particularly rude way. Information is "negative entropy," yet the world at large is entropic. To the extent that scholars and librarians try to build and maintain information systems, they are struggling against the laws of the universe. Theirs is the task of Sisyphus. Libraries, then, when viewed as processual objects reveal themselves to be either stupendous miracles or grand tragedies and perhaps both.

The reason for this has to do with processes inherent in information itself. Information is borne on "markers"—recognizable bundles or units of matter-energy—whose arrangement conveys meaning within specific symbol systems. Markers are in turn observed through or carried on "channels." Thus, viewing the patterned arrangement of ink molecules on a page or hearing the fluctuating pulsation of sound waves over headphones both represent acts of perceiving markers over specific channels. Once again, the emphasis here is upon process and event, not upon stasis or object.

INFORMATION AND CHANNEL SWITCHING

We have come to see, then, that what we usually refer to as information is not information at all. Strictly speaking, a book or a tape is not itself information, for information is not a "thing." Instead these things are channels over which markers that convey information are transmitted. Some might wish to argue that channels not only carry information markers but actually allow us to "store" these markers in permanent form. But such a notion ignores thermodynamics, and as any manuscript conservator can tell you, it is nonsense. Since the structured arrangement of matter-energy is itself not permanent in the universe, no library can aspire to be so. Markers may be stored on particular channels for very long periods of time but not forever. We must try to preserve the state of the channels as long as technically possible, but the best we can hope for by way of permanence is to provide translation or transformation devices to assure the faithful transmission of the information content from one channel to another.

This focus on process leads us to a more accurate, though rather more long-winded, definition of what a library is than that offered by our hapless freshman.

A library consists of a collection of information markers and the requisite means for storing them, consulting them, decoding them, and faithfully transmitting them from channel to channel in order to examine the nonrandom arrangement of matter-energy that their patterns represent.

It may not be more polite in this form, but the purpose of this redefinition is to enable us to think more clearly about the relationship between process and form in the library. From this perspective we can see that the library's essential functions are not wedded irrevocably to the "channel" of the book, nor for that matter, to any other particular channel. There is no *functional* reason—though there may be important historical ones—why the book should be the center of a library's attention. In fact, there may be very good reasons to abandon this channel or indeed any other channel if it no longer serves as the most efficient, most reliable, or most convenient channel available for the storage or transmission of information markers.

Ultimately the reasons for switching channels have to do with two phenomena: (1) the problem of "noise" and (2) intrinsic channel capacity. Noise is the nonpatterned matter or energy that is carried on a channel along with information markers at any one point. It can vary over time, and one of the reasons we say that a channel is deteriorating is that its noise level is getting too high. Too high for what? Too high for us to be able to distinguish the noise from the signal itself. When the level of noise increases beyond a certain point it becomes progressively

more difficult and eventually impossible to perceive the information markers on the channel. Thus, when the ink fades and the paper browns, or the scratches on the record produce too much static, or the stray white marks on a microfilm become too numerous, these channels can be said to convey too much noise, and our ability to "read" the information markers accurately from them can be impaired.

At this point any good librarian begins to consider transmitting the information markers from the channel in question to one with less noise so that the integrity of the information can be maintained for those who wish to consult it. The functions involved here include the classic ones of conservation and preservation but also those of photoduplication, xeroxing, rerecording, microfilming, etc. These latter activities require the explicit transmission of information from one channel, or medium, to another, and many libraries now consider the provision of these functions to be an integral part of their everyday tasks.

There is another reason beyond that of "noise" that draws librarians to become involved in the channel switching of information markers. This concerns the limits of the channels themselves. Each channel has its own upper limit as a carrier of information. When these limits are exceeded, the transmission of information through it begins to decline and can ultimately shut down altogether. In this sense, librarians often become involved in the transmission of information from one channel to another, not because the informational integrity on the old channel is threatened with noise, but simply because another medium has a higher channel capacity and is therefore more convenient, economical, or efficient for the storage or transmission of information markers.

Differences in channel capacity are truly staggering, and technical advances in the development of new kinds of channels have been enormous in recent decades. Consider, for example, the following description:

> Cuneiform tablets carried approximately of the order of 10^{-2} bits of information per gram; paper with typewritten messages carries approximately of the order of 10^{3} bits of information per gram; electronic magnetic tape storage carries approximately of the order of 10^{6} bits of information per gram; and it has been demonstrated that one can write with microbeams, through a demagnifying electron microscope on ultrafine grain films of silver halide in letters so small that they could store the content of more than a million books on a few cubic centimeters of tape, about 10^{12} bits per gram.[3]

Clearly there are major differences of convenience, efficiency and economy involved in the choice of channel. Choices are made all the time between alternative channels in a library, but not all channels are equally favored by librarians. There is a general trend toward favoring those channels with the greatest channel capacity, durability, and freedom from noise, yet there are very real operative limits imposed by the library's traditional self-definition. It is precisely this traditional self-definition that is now coming under scrutiny because of the expanded technical capacities of newly available channels.

Consider a trivial example. It is technically possible to transmit the information in the Manhattan telephone directory onto cuneiform tablets, but the advantage of doing so is not obvious. Since no user would want it in this form, no library considers providing it on this channel. User convenience is determinative. Or is it? Not quite. The advantages of making that same information available on electronic tape or machine-readable disk are considerable for a whole variety of people. Certainly access to a machine-readable form would be convenient for the user. In addition, since it is probably initially compiled by the telephone company in electronic form anyway, and since the printing costs of going into hard copy with this information are considerable, the telephone companies themselves may soon see the logic of "publishing" their information markers on electronic channels rather than through the channel of the inked page. But what about the library? What is its attitude to channel switching of this nature? Is it forever limited to dealing preeminently with one channel alone, that of "the book"?

Few libraries would consider their refer-

ence rooms to be complete without a copy of the Manhattan telephone directory. Yet at this point very few indeed could hope to provide access to it if the telephone company provided it on a tape cartridge or a hard disk. Moreover, virtually none would know even what to say to a request from a student to have the phonebook "scanned" with a Kurzweil 4000 optical character reader (OCR) so it could be provided to him or her on a tape to take home and examine with a microcomputer text analysis program. All of this is, of course, technically possible. Even freshmen are aware of this. Freshmen are also aware, however, that the library is not ever likely to provide this kind of service for the transmission of information onto an electronic channel.

It is not that librarians are against the technology of miniaturization. On the contrary, for very practical reasons they have championed the transmission of information from more extensive to more compact channels to increase the efficiency of its manipulation. I suspect, for example, that much of the microfilming that goes on in libraries today is taking place primarily in order to save space and provide convenient access. Here the primary concern may not be the maintenance of the full and faithful integrity of the information itself. Some information is inevitably lost as noise in any transmission, but the calculation is that whatever information is lost is not significant. Whatever is lost is more than compensated for, so the logic goes, by the convenience of access and durability of the new channel to which the information is transmitted.

Even durability may not really be the primary concern. After all, we are not that confident that film can be maintained over long periods of time, say hundreds of years, all that much better than paper and ink, yet virtually all libraries have committed themselves to transforming large portions of their collections, and acquiring whole new ones in this medium. Software will pose even more dilemmas in this regard, for we have no long-standing experience in the reliability of electronically stored information markers.

The activities involved in the channel switching functions of a library require an enormous commitment to machinery, personnel, technical processing, and operational facilities that have little to do with books. Yet few libraries any longer feel they can afford to forgo these activities totally, for all have come to realize that transmission of information markers from one channel to another is a vital part of their mission.

The question is no longer *whether* these functions should be performed, but rather: Under what conditions? For whom? How frequently? From what media to what media? What limits should be imposed on this infinitely expandable activity? Who should impose them? When provided, what costs should be borne by the library itself? What costs should be passed on to the library's clientele? Is "price" a fair delimiter of access? In a market-integrated democracy, what is "fair"? etc. All of these issues are operational manifestations of a larger underlying question of values: What relative importance should channel switching assume in the library's overall mission?

My own suspicion is that if libraries are to survive as life-forms in evolutionary terms they will have to devote a greater proportion of their functional effort to these channel-switching activities than they have in the past. This shift in function will undoubtedly have structural implications. Libraries that take on channel switching as a major portion of their activity are no longer going to be spacially organized around a card catalog, a circulation desk, "stacks," and a reference room. The beast will have a different shape. But more of this later, when we consider problems of coevolution.

THE LIBRARY LIFE-FORM IN ITS UNIVERSITY ENVIRONMENT

So far we have focused upon the processes that go on *within* the library as someone tries to use it. There is, however, another level of consideration. It is possible to move beyond the transactions that occur within a library, and focus instead upon the way in which the library itself takes on the characteristics of a whole living organism within a wider system. As

we shall see, these two levels of analysis are related, but for the moment let us turn to the attributes of a library as an organism situated in its wider environment.

Like all other life-systems, libraries are defined by characteristic exchanges of matter-energy and information with their environment. In this, libraries experience flux in the flow of matter-energy and information with their environment, and their vital processes largely involve the regulation of that flux. The quantities and rates of flow of these things are to a large extent autoregulated, since life-forms can only persist within certain ranges of these flows. They must process matter, energy, and information at certain rates in order to maintain their structure in relation to their environment. In short, libraries are not static, they are homeostatic.

All of this sounds manageable enough. As long as the flows of life rendering constituents are maintained within tolerable limits, the life of the organism should go on without difficulty. But what are the prospects that these life sustaining flows will be maintained within survivable limits?

Here's the rub. There are numerous signs, increasing every year, that we are in for some major perturbations of these flows. There is a lot of breathless drivel published in each new issue of popular magazines concerning the "information revolution." Most of it is "tech hype" and not worth serious commentary. Nevertheless, it is worth examining the ways in which changes in kinds or flows of information are likely to alter the operative environment of the delicate life-form of the library.

The immediate reasons for impending change in the flow of matter-energy and information to and through libraries are fourfold. First, microelectronic circuitry has enabled manufacturers to miniaturize computing power into highly mobile systems, allowing students to carry sophisticated computers directly to the points of customary information access. It is now quite feasible to enter notes from the laboratory, the lecture hall, or the library directly into electronically encodable storage memory.

Secondly, software programs and communications technology have advanced to the point that individual micros, picos, or hand-held computers can now be easily integrated with larger systems. This allows faculty and students to employ very powerful techniques of manipulation and analysis on vast amounts of information available through convenient access to external integrated computer networks. In the coming years the library will be just one of several available nodes in this information web. It will tend to be used only to the extent that it offers either unique kinds of information or commonly available forms of information that are less expensive and/or more convenient than those offered elsewhere in the new information environment.

A third key element in the shifting ecology of the library as a life-form is a new breed of organisms in the university, organisms that are at the very least a new form of information-parasite and potentially an information predator upon the library life-form itself. This new breed is the computer-literate college student. Technically speaking, this is not a new species of organism, but rather a particular population characterized by a radically new information-processing metabolism and a voracious, omniverous, and largely indiscriminate appetite for information. It is a fact that for the first time a computer-literate population is beginning to fill the ranks of the college student community.

The transition is taking place in stages. For the last several years it has been true that in many institutions the freshman class often knew more about computers than the senior class, reversing the classic profile of technical competence. In the next few years, however, this will change in those institutions where it has not already done so. One of the key authorities for news about the growing online community has quantified the change in these terms: "An estimated 80 million users of such services will be online by 1987 (compared to 400,000 in 1983)."[4] Even allowing for a substantial margin of overestimation here, it is clear that shifts in order of magnitude may well be involved in periods as short as three to five years.

The result is that from their point of entry, and cumulatively as they progress through college, student populations will expect to use computers as study aids and production tools for whatever they wish to undertake. Given the radically altered information metabolism of this population, their normal feeding habits are likely to affect other life-forms around them, particularly those to whom they have been taught to turn in the past for nourishment.

Professors and libraries have traditionally been the life-forms upon which the student population has attached itself as information parasites. Of course in overall systemic terms this population lives in a symbiotic relationship with the university at large because it offers matter-energy inputs in exchange for the matter-energy and information it extracts. In terms of information flow alone, however, it is still substantially accurate to characterize this population as parasitic on library and faculty life-forms.

Information parasites attach themselves to hosts and benefit from an asymmetrical and largely unidirectional flow of information, which saps the vital processes of the hosts without actually killing them. Libraries and faculty alike are often left in a severely weakened state by information parasites. If they are to reestablish their vitality, it will be largely through efforts they make to obtain nourishment from the administration—that controlling organism to which the incoming student population of information parasites has yielded its resources to establish its symbiosis with the university in the first place.

The fourth changing aspect of the environment that is likely to alter the flow of life-bearing matter-energy to and through the traditional library life-form is the emergence of new organisms within the living tissues of the university itself. Specifically, computing facilities seem to be burgeoning everywhere on campus and growing at what some might describe as a cancerous rate.

Whether they are located in centralized computer centers, departments or residential college dormitories, computerized information nodes are comparatively young but fast-maturing organisms in their own right. They too attract the growing populations of incoming information parasites, and in many ways they are better adapted to serve as hosts for these populations. To the extent that they begin to carry greater and greater numbers of these information parasites, these new organisms also require flows of matter-energy from the central administration in order to sustain their life processes.

With respect to the central administration, and in some cases in relation to the population of information parasites as well, these new organisms within the university occupy a niche that overlaps that of the library life-form. In terms of their respective dietary needs, this is clear. Both the computing organisms and the library life-forms require roughly the same kinds—though perhaps different magnitudes—of green matter to keep themselves functioning.

As far as the information parasites are concerned, each of these life-forms represents a slightly different niche, for although it is true that each of these organisms can provide nourishment of roughly similar informational content, the information markers are provided on widely different media. Past populations have been content to graze upon a high-fiber diet, and for this the library life-forms have served them very well. As we have indicated, however, there are signs that these feeding habits are changing among the new populations who are more accustomed to celluloid than cellulose.

Consider, for example, the gluttony of our telephone-book enthusiast. There are some members of the new population of information parasites who actually do expect to find massive amounts of information served to them on machine-readable channels. Perhaps not the Manhattan phone book itself, but other similar delicacies, such as United States census data or World Bank national accounts data or New York City Bank economic data, are known to be packaged in this form. A Wellesley, Massachusetts, firm, appropriately called SilverPlatter Information Inc., is beginning to serve up "megamorsels" of this scope, including the Educational

Resources Information Center (ERIC) database, to specialized researchers who can afford them.

In fact, the whole issue of machine-readable data is already well beyond the domain of specialized researchers. Compact Disc–Read Only Memory (CD-ROM) is revolutionizing the presentation of standard reference tools in the library, affecting the basic and most widely used of a library's services to students and faculty alike. It is only recently that many universities have developed online searching capabilities that require hardware investment, accounting, training of personnel, etc. Now whole portions of this domain of information are already migrating off the mainframes of large vendors such as Lockheed Dialog. Instead, the information is being provided by the primary data compilers to customers directly on CD-ROM discs. These come in either 12-inch laser disks or 4.75-inch (12-centimeter) CD-ROMs.

The evolution of this media has been staggering, in just a few short years.[5] It is still common, for example, to see a hard-copy version of *Books in Print (BIP)* in any reference section of a library. At the same time, however, it is now frequently consulted, in institutions with the appropriate equipment, in its online form through electronic links to vendors like Lockheed Dialog or Bibliographic Retrieval Service (BRS). Despite the seeming breakthrough in convenience and speed, this is likely to change yet again in the coming months. In all likelihood *BIP* will soon be consulted more conveniently through a computer terminal connected to a CD-ROM player, with a current version of *BIP* provided directly to the library from the publisher, R. R. Bowker. The same will be true, no doubt, for *Ulrich's International Periodicals Directory* and for the Public Affairs Information Service (PAIS). H. W. Wilson Company also apparently intends to sell CD-ROM versions of its *Cumulative Book Index* and *Readers' Guide to Periodical Literature*. Many of the basic bibliographic reference services are contemplating plans to sell CD-ROMs directly to users with subscriptions to quarterly updates.[6]

Moreover, publishers of other large reference materials are likely to follow the exemplary lead of Grolier Electronic Publishing, which in mid-1986 issued the *Electronic Encyclopedia*, a CD-ROM version of its twenty-volume *Academic Encyclopedia*. The hard-copy version of the *Encyclopedia* contains ten thousand pages of printed text, representing sixty megabytes of information. All of this can fit easily upon a single 4.75-inch CD-ROM disk, and students can use the powerful electronic searching capabilities of the accompanying software to scan, select, print out, or save needed information—in seconds on floppy disks—for further manipulation with word processors or other software.[7]

Indeed, in the coming years very important portions of published information, once available freely to libraries in hard copy, may simply no longer be available in any form *except* machine-readable ones. Government agencies, in would-be cost-cutting gestures, are comtemplating dropping the paper publication of many document lines previously provided to depository libraries and substituting machine-readable tapes. Since researchers need these types of information in this form in order to scan them for meaningful patterns, it is logical to expect the information organisms on campus to provide them in such a usable form. Can libraries cope with this prospect? Do they even want to? Should they want to?

In the current state of affairs, freshmen already suspect, and sophomores most certainly know, that such forms of information—though they may be vital for their particular inquiries—are probably not going to be found in the library. So sure are they of this that they simply never ask for them. They are not likely to be there, so why embarrass themselves and others by asking? Very quickly they learn what information to expect and what *not* to expect from the library.

If they really need this kind of information, or similar masses of data in electronic form for rapid analysis, these students have learned to go elsewhere, for the library can no longer meet their information

needs. The computer center may be of more assistance, but even this is not assured. The corporate library of an average insurance company may have become a better-equipped environment for many sociologists to pursue their work than the average university library. It is a sad fact of the "information revolution" that, over the last few years, universities as a whole—even with all their new facilities—have diminished in relative importance as channels through which people seek information for research purposes in our society.

So what is so tragic about this? On the face of it, it might seem advantageous for library life-forms to rid themselves of information parasites and regain some of their vitality in this fashion. Such a strategy seems well conceived at the organismic level, but unfortunately it bespeaks a naïveté about the functioning of the university ecosystem as a whole. It must always be borne in mind that, although in their relation to the library, students and faculty are information parasites, in relation to the university as a whole they are life-sustaining symbionts. The administration receives vital flows of matter-energy from them, and it has a very real interest in catering to their needs.

As part of this process, the administration monitors flows between the information parasites and all life-forms on campus. Shifts in the relative flow of matter-energy to library life-forms may well result from administration perception that the needs of information parasites are better served by other life-forms on campus. If there is a greater demand for gaining access to information in computerized form than in conventional forms, the administration may well decide to shift resources. In my own university those who regularly use social science information are beginning to wonder if the library can hope to provide what they really need in terms of database access. There is serious talk of setting up a computerized, alternative, social science "decision support system." Clearly then, it is necessary to develop an understanding of how the ecosystem as a whole works to be able to judge the evolutionary prospects of any one life-form within it.

THE COEVOLUTION OF LIFE-FORMS IN UNIVERSITY ECOSYSTEMS

Over the last several decades students of living systems have made us aware that all life-forms have an appropriate ecology. The ecology of a life-form consists not simply of its surrounding inert environment but also its integral relations with other life-forms, some of which may have radically different ways of processing matter-energy and information.

In many cases, individual life-systems have only come to exhibit their present characteristics because of their coevolution with other life-systems. Because of symbiotic dyads neither organism would exist in quite the same way without the other, since each organism depends upon the other to meet its own needs. The extinction of one implies a radical change in, or perhaps even the corresponding extinction of, the other. The emergence or introduction of radically new species tends to alter the operating parameters of all the others. Similarly, general systemic changes in the rates and amounts of matter-energy and information flow in the system can have similar disruptive effects.

All of these shifts in ecosystems provoke existing species to adopt a variety of survival strategies. For example, to the extent that two or more life-forms come to occupy the same or overlapping niches in the system, they may become locked in battles of competitive exclusion for the same resource base. It would be a mistake, however, to think of these evolutionary struggles in gladiatorial terms. There may be dramatic encounters along the way, but these will only serve to punctuate a much more subtle and gradual process. In evolution we are dealing with survival of the "fittest," not survival of the "fattest."

Indeed, in an age of heightened matter-energy and information flow, the "fattest" may be at a distinct disadvantage, for they lack mobility and have to devote a large portion of their matter-energy intake simply to functions of system maintenance. My own university has recently de-

voted hundreds of thousands of dollars to repointing the masonry in one of its library buildings. Meanwhile the computer center's infrastructural expenses involve changing light bulbs, and even this is not done very often. If there is survival advantage in being lean, clean, and mean, there is no question as to which organism will emerge victorious.

The issue of fitness, then, is not one of size or momentary strength; it is one of relative reproductive success over time. Library life-forms need substantial investments of budgetary green matter to reproduce themselves socially and maintain themselves physically over time, and this is not forthcoming without a willful commitment on the part of the university administration. Moreover, it is only likely to be forthcoming so long as the library is seen to provide essential and nonredundant services to the university's major symbionts. Rational administrations do not look kindly for long on reduplicated effort or wastage, and for this reason they are not likely to tolerate battles of competitive exclusion for common niches within systems they administer. This in itself is a very powerful reason for suggesting that the major form of evolutionary change will *not* involve these kinds of battles for very long. There will be strong selective pressure exerted in favor of other behavioral strategies for survival.

One possible alternative strategy for life-form survival will be conscious or unconscious specialization, leading eventually perhaps to further speciation. Organisms will either attempt to differentiate their consumption needs or change their characteristics as hosts to avoid competition with other life-forms within the system. Thus some information-processing life-forms can limit themselves to dealing only with one kind of channel—books, maps, tapes, etc. Others may choose to diversify their feeding strategies, in search of green matter outside the university itself, simply in order to be able to maintain or expand the number of channels through which they can offer information to clients.

Perhaps more probable, however, is yet a third strategy often witnessed in natural systems, and that is the one of behavioral mimicry or morphological imitation. As one scientist explains the phenomenon:

> The Bee Orchid (*Ophrys apifera*) contrives to resemble a female bee: male bees are attracted to the plant, transfer pollen from one plant to another, and so accomplish fertilization. In a similar spirit, the Tartan Tongue Orchid of Australia has flowers which resemble the females of a certain Ichneumon wasp. Another Australian orchid imitates an ant. Some moths imitate the hornet; a hoverfly mimics the honey-bee; and a beetle resembles a wasp. There is even a case of a spider, holding its front legs aloft to look like antennae, struggling to mimic an ant.[8]

This may well be the best strategy for library survival both with reference to meeting the demands of the students and faculty and in terms of continuing to justify the library to the administration. In this vein, libraries will take on many of the capabilities of computer centers to handle electronic media and make documentation available in machine-readable form.

For their part, computer centers, for the sake of their own survival, will begin to adopt traits traditionally characteristic of libraries. Not only will they begin to catalog, conserve, and archive material in much the same way as librarians have learned to handle books in the past, but, in addition, the nature of their user-service facilities is increasingly likely to match the convenient, efficient, and considerate reference service we have so long enjoyed in university libraries.

Coevolution will inevitably proceed—even if in the direction of heightened estrangement. Conceivably, for example, new breeds could emerge with accentuated defense mechanisms or patterns of behavior designed to foster avoidance. This would be unfortunate for the free flow of information within the system as a whole, and may seriously undernourish the resident symbiont populations. It is perhaps more likely, however, that convergence rather than heightened speciation will be the emerging coevolutionary pattern. If agents in charge of the organisms within the university begin planning now, they most certainly can influence the

probable patterns that coevolution will take in the system as a whole.

REMAINING PRACTICAL QUESTIONS

All of this is a bit abstract and may have no more than metaphorical value in helping us to think about the coming problems. But in practical terms, just what are these coming problems? Predictions are about as reliable as palm reading or stargazing at this point. Moreover, in general terms things will probably not be transformed as quickly nor in the same directions as the agents of "tech hype" would have us believe. People are too complex and their purposes too diverse to make simple predictions meaningful. Nevertheless, we can pose some questions. Not all of the following general subject areas relate to the library itself in every one of their aspects, but they do describe some of the dilemmas that the new information technology will pose for the university environment in which libraries will evolve.

Library Access with New Computing Power

It is probable that students with a "hard card" installed in a lap-sized portable will be able to carry with them by the end of this school year as much as ten magabytes of information (roughly the equivalent of six thousand typewritten pages) in something a little larger than a notebook. Are libraries equipped to allow students to use these as note-taking devices throughout library premises? When libraries finally convert their card catalogs to machine-readable form, will they allow students and faculty to "plug in" to the catalog from their hand-held, lap-sized, or portable computers? Will libraries support a phone connection to the catalog? How many "ports" will be allowed for this? Will they be able to bear the hardware costs to meet this potential demand over the phone wires? Should students or faculty using this mode of access to the library's cataloging system be charged for it?

Assuming that technical and operational questions of online connection to the university's multiple libraries are solved, what kind of service should be provided once the online connection is achieved with ease? Will separate categories of users be created with differential access and privilege levels (determined perhaps by passwords)? Who will issue passwords: the library? the Bursar's office? Will there be any means of controlling unauthorized or fraudulent use of online access to the catalog? Who will assess cases of this sort? What will constitute "illegal" use of the system? Will users be able to undertake title, author, or subject searches and save the results on diskette? If so, who "owns" the information on the diskette? Will all university users have the freedom to copy, transform, and reformat the card catalog entries freely and for their own purposes, representing it as their own work?

Problems of Keeping Transaction Records

All libraries must keep track of which books circulate and to whom they are checked out. The use of computers to do this allows librarians to monitor and analyze the usage patterns of their holdings in very important ways. Since decisions about future facilities, services and staffing require this kind of information, librarians would be remiss if they did not collect it and analyze it on a systematic basis. Obvious problems arise here, however, for this is potentially misusable information. In the past libraries may not have exercised a tight control over the pattern of their acquisitions because they did not fully control the information necessary to do so. With computers, however, it is possible to keep careful track on which books or which types of books are most heavily used. From strict cost-accounting perspectives it may make sense to focus acquisitions in this realm alone, since this reflects user preference as expressed by user demand. Is this appropriate? If not, what mechanisms are there to assure that these criteria are not important in collection-building or -maintenance decisions?

Potentially more ominous is the undetectable ability of the library to track patterned user transactions. Few surveillance

systems could be devised that would render as much information with such a low profile as one based upon a complete, real-time report of what an individual user has consulted in the card catalog or on the shelves or what he or she has checked out of a library. The application of computer technologies to library systems makes this kind of surveillance possible and perhaps even necessary. What mechanisms exist to assure users of the strict confidentiality they have come to enjoy in library transactions in the precomputer age?

Training and Support

To what degree should libraries assist students and faculty in conducting their library research in electronic form? Will they simply maintain up-to-date information on the development of computer technology on bibliographic manipulation so that faculty and students can go and read it for themselves? Should libraries instead take a more forward role in providing faculty and students with training in how to use the resident systems or how to interface the resident system with a whole variety of privately available pico- and microsystems? If only some micro-interfaces are supported by the library, which ones shall these be? On what basis should they be selected? To what extent should they be supported?

Programming and Staffing

Should libraries recommend or endorse bulk purchase and resell communications software that they know works best with their systems? How will they keep abreast of what is being produced in document handling and bibliographic software that would be of use in this regard? Are they prepared to hire staff to serve as full-time faculty/student advisors on documentary computer matters? Should libraries instead employ programmers to develop applications software that is custom-made for their installations? Or, should they employ programmers whose full-time job is to assure linking capability to whatever software is available commercially? Should libraries develop a staff position for a computer coordinator to oversee the library's computer systems development in such a way as to allow it to communicate with itself and with others?

What will the extensive use of computers in normal library functions do to the pattern of library hiring and the structure of library personnel compensation? Will specialized computer skills become the necessary minimum for library hiring? Can the libraries afford to pay the going rate, in a competitive market with the business community, for the personnel with this training? If it cannot, how much of its resources must it devote to training initially unskilled staff in this regard? Once the staff is trained, how can the libraries hope to hold on to them if their skills are marketable elsewhere?

If computer skills become the new minimum floor of expertise needed for work, what is the fate of existing staff? Will the unprepared be fired or phased out? Should they have to bear the costs of their retraining? Should that retraining be provided in the library itself, or will librarians be told to "go back to school?" If so, where will they go for useful instruction at an affordable price? Does the retooling of the labor force mean the *de facto* devaluation of existing jobs? Will the progressive application of computer technology in libraries force a further accentuation of an already hierarchical labor force structure, whereby a larger mass of library tasks will be reduced to simple interactive routines with CRTs, while a diminishing portion of jobs involve responsibility, decision power, or even regular human interaction? What will this do to library salary structure, morale, and operating expenses?

Online Searching Services

Most university libraries now have online searching facilities with BRS, Lockheed Dialog, and ORBIT. Should these services be maintained, extended, or dropped as individual researchers develop their own capacity to access these sources? Where does the obligation to provide them begin? Where should it end? If they are maintained and/or expanded, what should be the practical limits set on their use? Who should have direct access to online search machines and search

time: librarians alone? trained faculty and librarians? trained faculty, librarians, and students? Who will do the training of library staff? Who pays for training sessions: faculty? students? Should online search training be part of regular library instruction given to all freshmen? Is "not everyone wants it" an acceptable answer, given that so few people know it is available or know what it can potentially do for them?

Should libraries support this kind of service at all? Or should they let it be taken over by the "information brokers" now surrounding university campuses—those petit bourgeois entrepreneurs who not only do research for a fee, but probably "ghostthink" as well as ghostwrite papers for students? Will students be rewarded for handing in work (say an annotated bibliography) that can now be done by a computer? Should librarians, out of convenience to themselves, encourage users to conduct their library work in this manner? Should the full costs of this kind of work be passed on to the user? If so, in what sense has the library fulfilled its mission in an academic setting? Hasn't it instead merely transformed itself into an extended network of workstations for commercial information profiteers?

Where are the ideals of free and unimpeded inquiry—often pronounced on university campuses—in all of this? Do we live in a free society or a free-market (i.e., expensive) society? Should the flow of information be buffered from the influence of the free market in a free society? If information is power, and information is expensive, then the wealthy are powerful. Does the university and its library, by the way it provides access to information, have any role in the broader society *other than* that of simply replicating market relations of power?

Can the university really hope to sustain the costs of these forms of information? Some databases with timely economic information can cost as much as $1,800 per month. Libraries already find serials in hard copy an expensive proposition as a sustained expense—what about electronic newsletter services and the enormous subscription costs they imply?

The Desktop-Publishing Glut and Selectivity

Are libraries prepared to cope with the publishing explosion implied by the imminent, widespread availability of laser typesetting printers? Within a few years, if not already within a few months, it will be feasible for small groups, such as university departments, research teams, or student groups, to publish individual reports, books, booklets, tracts, newsletters, journals, occasional papers series, etc.

The library has traditionally depended upon an arbitrary "filter" for ephemera, and confined itself largely to the acquisition of *published* material, usually from the reputable publishers. Laser technology, though it has been available for a while, is only now coming into the price range of the individual consumer. Furthermore, walk-in "copy shops" are making laser-typeset, camera-ready copy available for as little as fifty cents per page, and similar typesetting is available, for two dollars per K of text, over conventional phone lines.

This is likely to mean that the volume and variety of published material is going to explode in the coming months and years. The Xerox machine put the power of duplication into the hands of the common person. The laser printer will put the power of publication into the hands of anyone who knows how to use a keyboard. Much of what will be produced will not be worth collecting for preservation purposes, but some of it will. Furthermore, it is important for future scholars, in at least some libraries, to collect even the most trivial current ephemera in certain fields. I suppose Cooperative African Microfilms Projects (CAMP) programs could be devised on a massive scale.

Who will collect this material? If all of it cannot be obtained for practical reasons, what criteria of selection will be applied in acquisitions departments of libraries when this material begins to gush through the door—at a very low cost or perhaps even free? Will scholars be involved in determining the selectivity process, or will this be left to the professional librarians with their own sense of collection priori-

ties? We may be past the time when a policy of total acquisition is feasible, but what will replace it when the flow in *published form* increases by orders of magnitude over what it was a few years ago or what it is today? Can a university research library afford *not* to acquire this newly published material and still fulfill its mission? How can a library avoid giving all its resources over to acquisitions and cataloging?

A proportionately small, but nevertheless quite massive and important, subset of this new flow of hard copy involves computer literature itself. New journals are appearing daily on subjects in the field, ranging from, on the one hand, the technical capacities of machines and detailed descriptions of hardware and software-programming problems to, on the other, more general or discipline-specific journals such as *Social Science Microcomputer Review, Computers and the Social Sciences,* or *Computers and the Humanities.* Some libraries have done valiantly in keeping up with these, but there is room for improvement. How should acquisitions be handled here? Who should decide which subscriptions are established: librarians? faculty? students?

What about computer manuals, programming aids, or the like? These are publications whose immediate value is very high but that are outdated quite quickly, perhaps even in a matter of months. Given their short shelf life, should they be acquired at all? If so, which ones? If not, what are the hidden costs to the library of *not* having them in the collection, as students and faculty increasingly come to regard their libraries as useless for major realms of their concern? Nothing will increase user indifference toward a facility faster than a persistent pattern of inability to acquire what users need for their work. If libraries come to regard user needs as ephemeral, current users can quite easily come to regard libraries as dispensible. In coevolutionary terms, this is quite clear. As organisms evolve out of mutually beneficial symbioses, each can afford to do increasingly without the other. By not taking their users' needs in this realm into account, libraries could destroy a symbiotic relationship, the ultimate results of which would be detrimental to themselves. Yet to sustain the symbiosis, as the information-feeding habits of the symbiont population become all the more voracious, is a very expensive proposition indeed—one that will require a massive ingestion of budgetary green by the libraries themselves.

Acquisitions, Cataloging, and Circulation of Electronic Publications, Software, and Data

What about information on electronically readable media? Will the library establish a policy for the systematic acquisition of texts available on electronic tape, diskette, or CD-ROM? Already several journals appear regularly on diskette, and book publishers make diskette editions of their books available as well. For the moment these books are predominantly computer-program books with extensive code written in the text. It is not feasible for readers to retype lengthy code without making errors, so in the interests of accuracy, they will often buy the published diskette version of the book. Will libraries acquire these books/diskettes? Will scholars be able to consult these sources in this form?

Numerous literary projects are converting text to tape and making the results available for extended consultation. As scanning equipment for the conversion of printed material to electronic form becomes more widely available, the retroconversion of already published texts onto tape, disks, or CD-ROMs promises to be massive. Rutgers has begun a collection of this material in a systematic fashion. Will other university libraries follow? Should they? Or should Rutgers become an effective "national center for machine-readable text?" Will any provision for interlibrary loan of this kind of material be made? Or is it better simply to make copies available as a form of electronically published editions? Once a CD-ROM master copy is made of a "closed" collection or whole corpus of selected texts, multiple copies of it can be replicated very cheaply, yet as this form of CD-ROM publishing of whole library collections becomes more widespread, guidelines for the acquisition

and circulation of this material will have to be established. For research purposes it may be more practical for university departments, research teams, museums, or laboratories to acquire CD-ROM subscriptions to specialized materials with appropriate periodic updates. Clearly, not all university libraries will be able to afford to acquire all that will be produced in this form; yet if they do not, information-hungry researchers will migrate elsewhere, leaving the university library to shift its role from that of a major research resource to a collection of the lowest common denominator of usable reference tools.

Oddly enough, while economics of scale have led many university library systems to move away from the logic of decentralized departmental libraries in the recent past, new availability of CD-ROM research collections with periodic updating and retrospective conversion may radically reverse this trend in the coming years, restoring or establishing the autonomy of microlibraries dotted all over the campus. What will become of the whole idea of the university library in this context? Can it even hope to maintain "bibliographic" control or a union catalog of the university's holdings? Without careful planning and coordination between these semiautonomous research nodes, there could be an inordinate amount of duplication in CD-ROM acquisition with considerable reduplication of effort and expenditure.

What about acquiring and circulating software? Much is now available in the public domain as "free ware," "share ware," or "cheap ware." These are enormously important sources of information, and, from the point of view of their content, they would seem to qualify in all respects as the type of document libraries have traditionally obtained as a matter of course. For example, libraries have regarded it as normal to provide indices to periodicals as part of their reference holdings. In several instances, now, indices to important journals are available on diskette simply for the cost of the diskette itself. Should the reference room provide the computers and reference diskettes for these journals? Should lending libraries of free ware be maintained? Should users be allowed or even encouraged to copy free ware for use in their offices or at home on their machines?

What of the CD-ROM reference material in this regard? Tools like Grolier's *Electronic Encyclopedia* will come with software that is *intended* to enable users to copy material verbatim onto other electronic media for manipulation in word processors or incorporation in its exact form in their own work. If photocopying has posed problems of copyright infringement in the past, it is simply overwhelming to contemplate the potential for abuse in this realm with the widespread diffusion of CD-ROM publication. In a recent conference on CD-ROM technology, sponsored by Microsoft in Seattle, Washington, one participant jested that "autoplagiarize" could be a new command built in to future CD-ROM software, perhaps corresponding to a single keystroke to facilitate the rapid acquisition of information in usable form.

In effect, the university library, by providing the technology for massive "channel switching" of information flow to scholars, could itself become an accomplice in undermining the historic principle of copyright for which it has so long fought so valiantly. The response of publishers to this potential for abuse has often been to price their product so as to include compensation for the effective loss of control over copyright, such that even if the information they provide is copied beyond the bounds of existing copyright regulations, the publisher has still recovered his costs by the inflated price charged for the copyable version of the original. Software firms now regularly advertise "non-copyprotected" versions of their material at higher prices than "copyprotected" materials.

University libraries regularly purchase other sources of information that it would be prohibitive for individuals to buy in order to allow certain kinds of research to proceed. Should they not do so with software? Could they not seek to enter into purchasing or license arrangements with software vendors to enable the enlarged li-

brary community to have access to numerical or text presentation? In what structural ways does this differ from a serial subscription, for example? Much of what is available in software has been created to meet the needs of a business-user community. This is not surprising: these are the clients who pay, therefore their tunes get played. But what of software that would be specifically useful for academic environments? Should academics and librarians merely wait for it to be provided by commercial companies out of some *pro bono* obligation? Or should university libraries, in coordination with faculty and university computing facilities, take a more active role in designing, writing, or commissioning useful academic software?

If several universities were to combine their efforts on any one of these levels to generate versatile bibliographic software, libraries would be among the first to benefit, since the ease of user interaction with information sources would be greatly improved. Should libraries take the lead in forging this kind of interuniversity coordination or cooperation? Certainly of all the institutions on campus, the library, through interlibrary indexing systems and loan arrangements, is the one organism that has the longest history of cooperative effort in information sharing. Experience in this realm may be a disadvantage if planning on this level is still confined to "the book," but potentially, librarians should be able to take the initiative in these moves.

Librarians may be the best-positioned community to take necessary collective action in yet another area—the continued acquisition of vital government data. Government agencies, upon the suggestion of the Office of Management and Budget, are seriously considering the possibility of making major sources of government statistics available, at present, *only* in electronic form. Are the government-document sections of libraries ready to cope with the information in this form? If the production and distribution of this material in electronic form is given over to the private sector in the name of governmental cost-cutting moves, are the universities in a position to be able to pay the new costs for what they used to receive for nominal fees as depository libraries? Are they prepared to reequip the government-documents facilities of their buildings in order to accommodate the necessary workstations, plotters, printers, and trained personnel? Can the universities act effectively together to assure that government agencies will continue to provide information in hard copy? If not, which universities are likely to get left behind in accessing government data? What indirect effects will this have in the long run on the ability of universities to attract certain kinds of faculty and teach certain kinds of subjects to its students? If certain kinds of information parasites do not find nourishing prospects in one environment, they can permanently migrate to new feeding grounds.

Library Cataloging, Preservation, and "Publication" of Its Collections

The rapidly evolving CD-ROM technology is likely to conflate several previously isolated library functions in the future. For example, with "closed" collections of manuscripts, archival material, private papers, period photo or map collections, etc., it is now becoming feasible for individual institutions to transfer faithful images of this material to CD-ROM storage media in an inexpensive manner. Through what is becoming known as WORM (Write Once, Read Many) equipment, libraries will be able in effect to create their own CD-ROM reference collections. This serves several purposes, simultaneously. First, the material is put on a medium that is very versatile and conveniently accessed by users without endangering the deterioration of the originals. Secondly, the material can be thoroughly cataloged, indexed, and cross-referenced as a simple step in the process, providing powerful access tools for the collections' effective use. Thirdly, to cover the costs of initially undertaking the creation of a master disk of the collections concerned, the library could begin to circulate the CD-ROMs for a fee or simply sell them to other institutions or, indeed, individuals. Entire collections of fixed material including such things as medieval Spanish

literature, nineteenth-century train schedules, or twentieth-century comic books could be "published" in this manner.

Data/Text Presentation versus Data/Text Manipulation

When massive amounts of data become available only in machine-readable form, what is the library's responsibility for providing the necessary hardware and software for its presentation and/or analysis? Libraries have traditionally never acquired microfilms without also getting the machinery to make these data sources available for consultation. Will the same be true of data on magnetic tape or disk? In this medium, what is the difference between presentation and analysis? With large amounts of economic statistical data, for example, are printed columns of numbers useful or even meaningful? Is the library obliged to present the information in such a way that the patterns within it can be revealed from the "noise?"

In this instance, then, should statistical packages with graphic display and plotting capability be standard equipment for each library collection handling machine-readable data? What about programs for KWIC (Key Word In Context) sorts on literary texts? Since university computing facilities are regularly equipped with SPSS, SAS, or the like to allow economists, sociologists, psychologists, or statisticians to see patterns in their data, then on what grounds should the library *not* provide homologous tools for textual manipulation that allow literary critics, students of language, or intellectual historians to perceive previously hidden patterns in their "books"? Should library map collections be expected to provide the enhanced computer graphics hardware and the requisite software to enable researchers to view and analyze LANDSAT tapes upon demand? When museums make large photographic inventories of their collections available for research purposes on laser disk, where should the equipment to "read" these disks be located? in the university museum, in its computer center, or in its research library? When software is provided on CD-ROM disks to manipulate and copy information from the accompanying information bank, what is the library's obligation or liability in providing the hardware to copy, transform, and reformulate this for research and publication by scholars? Embedded in these seemingly mundane equipment issues are fundamental educational decisions that university officials, librarians, and faculty should be invited to reflect upon together.

In addressing these issues there is considerable room for creative symbioses to emerge here between the different life-forms on campus. Columbia University's announced intentions of integrating many of the library and computer center functions through a mutually accessible computer communications network known as the "Doughnut" may well serve as a national model for this kind of mutualism. Efforts toward cooperative planning could very well be advanced by the Research Libraries Group on an interuniversity basis as well. At the very least, deliberate, top-level planning should begin at each institution between the administration and those responsible for the libraries and computer facilities as well as representatives from a broad range of faculty disciplines in order to discern the ways different constituencies conceive of the forthcoming evolutionary changes.

CONCLUSION: ORGANISMS, THINGS, AND THE METABOLISM OF THOUGHT

In developing these planning strategies, it is important to keep in mind that we are dealing not so much with things as we are with life processes. The danger in talking about life-forms as if they were things is that it is all too easy to become dismissive of mere "objects." Consider the book itself, for example. As a "thing," it can be described as a piece of late medieval technology used as a channel for the extended storage of information markers. As we have seen, there are more efficient, less costly, and more convenient channels for information markers, and I suppose all the information in books could technically be placed on these other channels. Consumers who become accustomed to other kinds of channels may well expect that all

information they need should be provided to them on these other channels. Where this can only be undertaken at the cost of obtaining or maintaining information in book form, difficult choices will have to be made.

The real tragedy implied in these choices, however, is masked so long as we are dealing with "things," for in the vocabulary of things we think primarily of cost/efficiency ratios, trade-offs, and the like. It is all too easy to obscure the fact that in this manner the interests of some life-forms on campus are going to suffer in terms of their proportional allocation of resources in the system. Depending upon their respective metabolisms, selected life-forms may experience stunted growth, death, and extinction.

This is why we need to be careful, for there are some very delicate life processes sustained by the life-systems currently in place. We ought not dispense with these forms too lightly. The scholars' ultimate concern is with life—the life of the mind. In order to sustain this, they must necessarily form enduring symbioses with information systems that enable them to nourish this delicate form of life. The life of the mind cannot take place in a vacuum, and in many respects what we characterize as creativity or originality involves more accurately a process of reordering previously available thought. It is the act of rearranging that constitutes creativity. Pascal put it with characteristic honesty when he described the activities of his own creative process:

> Let no man say that I have said nothing new—the arrangement of the material is new. . . . Just as the same thoughts differently arranged form a different discourse, so the same words differently arranged form different thoughts. The last thing one does in writing a book is to know what to put first.[9]

In writing a book it is indeed difficult for a scholar to know what to put first. This is necessarily so—not because writers are personally confused, but rather because "the book" is but an artifact, a residue, of yet another process, a life-process that is still only dimly understood, and perhaps never fully describable: the phenomena of thought itself. The writer's task is one of transforming a process (thought) into an object (book). It is an exhausting and exhilarating activity and one that is, unfortunately, all too prone to a kind of arrogance emanating from the illusion of originality. Scholars easily forget that they are locked in coevolution with the life-forms that sustain their thought. In particular, they often neglect the evolution of libraries as a vital aspect of their own survival.

A library's essential task is to arrange the objects to favor the metabolic processes of thought. To feed the life of the mind the scholar devours this ordered information, reformulating it and arranging it again in yet other objects which the library must in turn arrange anew, making them available to nourish the life of yet other minds. Since in all of this the life functions of the scholar and the library are reciprocal, their coevolutionary fates are one.

It is for this reason that mutual discussion is more urgent now than perhaps ever before. I suspect that in this movement toward collective deliberation, librarians will have to take the lead, for there seems to be little awareness—let alone planning—among the faculty at large in the face of the altered information environment we are all beginning to experience. Librarians by virtue of their professional training and daily exposure to these issues are better informed and more likely to see the implications of the coming transformations for the entire educational community.

We started with the sober observation that libraries as we know them may become extinct. The logic of coevolution is such that we as scholars cannot be immune or indifferent to the transformations occurring in library and information science. Indeed we, the members of the scholarly community, must acknowledge that, given the importance of the decisions you as librarians will be making in the coming months and years, our coevolutionary fate is in your hands. Many delicate life-forms depend upon the kinds of environments you choose to sustain or decide to create. Be wise, be kind, be careful.

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EXTENT AND NATURE OF CIRCULATION

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Quiescence, Query, Quandary, Quietus: Public Services in the Library of the Future

Henry Snyder

This paper considers the future library from standpoints of academic administrator and scholar. As the former, what will be the cost of the new services? The latter sees a knowledge explosion occurring in own lifetime. Humanists are still not adjusted to the new environment. In terms of technological revolution many parts of the library are still unchanged. Librarians must help them stay informed about new developments in their respective disciplines and teach them new technologies to access material.

s one considers the demands that users will place upon university libraries within the next two decades, the only thing we can be sure about is that the environment and the demands will be different. Some factors will remain the same. Librarians will continue to be called upon to serve a diverse public—the new freshman, the advanced graduate student, the professor, the staff member, the general public. These patrons may not bring any greater expertise about accessing traditional library resources. But they may be expected, increasingly, to be computer-literate—however that term may be defined. Today I want to suggest what services librarians may be expected to provide. I will speak from the point of view of a teacher, a scholar, a university administrator—and as the manager of a large database.

I think that we may take as a given that every faculty member, every clerical staff member, and probably most students will have personal computers. Certainly everyone will have full access to one. We may take as a second given that through telephone lines, local area networks, or some more sophisticated means, they should be able to enter the systems where the data they seek reside. They will also be able to query libraries online. By 2000 we may be in an environment where librarians never see their clients—or at least not those who want access to information that is stored electronically.

In my university the library offers formal classes for undergraduates on the use of the library. I suspect such instruction may be even more necessary when the library's processes are managed through a computer. The present proliferation of systems designed for libraries suggests the need for an orientation session for each new student, faculty member, and employee on how to use the catalog, order books, use interlibrary loan, or order tele-

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print, perhaps from his or her own personal printer. Advanced classes should be conducted for accessing information outside the campus via a terminal. They should probably be organized by general area—humanities, social sciences, life sciences, and physical sciences. The first-named group, in particular, has very different needs. Guides, classes, and training sessions will become an ever more important library responsibility.

I manage a large bibliographical database, the Eighteenth Century Short Title Catalogue. It currently contains nearly two hundred thousand records and eventually should double in size. Many of the items exist in only a few copies, sometimes only one reported, widely scattered over the globe. All too few of the scholars for whom it is intended are aware of the database's existence (that is my problem) or, if aware, have no conception of how to use it. This is a wholly new way of conducting research for them. It is an extraordinary file accessed by search mechanisms of great power. Now that the texts themselves are being made easily available through an enterprising, parallel, microfilming project, they are potentially available to every scholar in their homes or libraries. This can revolutionize scholarship. How are we to make my file a basic tool for scholars, bibliographers, and catalogers? Librarians can run searches for them, if they discover it, as they do for other files. But ultimately all individuals must learn to access it for themselves. Those readers must also become a part of the technological revolution.

Training will need to be conducted on the local computing environment outside the library. What programs are available to the user? What are the best ones for the task in which the user is engaged? Can they be downloaded to the individual personal computer, or are they available by disk from the library? Will the library lend programs as well as books? Will there be terminal rooms just as there are now study halls and carrels? Who will assist the student or professor in selecting the proper kind of format for the final product? Will the library have a graphics- and text-processing center for producing special copy? Is this a library function? What will distinguish the task of the computer center from the library's?

As an administrator, I must be concerned about cost. How much of the training, the use of equipment and software, the access to off-campus databanks, and the databank time will the library absorb? What about interlibrary loan? Surely the readers ought to have direct access to RLIN or OCLC files in order to search for titles. If they do, should they not also be able to order the items directly? It would save time and labor. But how could libraries manage such a system, given the current protocols, priorities, and restrictions governing loans? Or will this become a moot point, with electronic transmission of texts and/or the creation of central databases of text? Would the readers be billed?

The new environment is going to be an incredibly expensive one by any standard of the past or present. How do we maintain economy and still provide maximum service? What kind of search will elicit the information one requires from a databank in the quickest and most economical fashion? How is this taught? Will the librarian continue to be an intermediary conducting the actual search? Who will determine the limits of what can be requested? We all know how physicists can tie up an entire university computer for an extended period of time with their calculations, given half a chance. Will time limits of some kind be placed on searches? Can relevant portions of databanks be downloaded to a minicomputer for class use? For most purposes, the library is now a free service. Even interlibrary loan is often free. How long can that continue?

The library, like all institutions, is or will be profoundly affected by the technological revolution that characterizes our age. Yet though we have the technical marvel of a MARC, an OCLC and an RLIN, are we sometimes misled by overestimating the extent to which this revolution has engulfed the library? The library is one of the oldest institutions of our civilization. The revolution of movable type and printing supplemented by the rotary press was the only major change in the production of raw materials for the library in five centu-

ries. Card catalogs were merely more efficient and costly replacements of hand ledgers. Most libraries have now progressed to the point that newer titles are cataloged in a machine-readable file. Checkout is becoming more sophisticated—so much for the current level of automation.

The task of the library is still essentially unchanged after hundreds of years: to secure, preserve, and make accessible the wisdom of humanity as preserved in written, then printed form. On every RLG campus the mission and the means are little changed from those employed by our forebears a century ago. Indeed, the real crisis is that we are being engulfed by, and have not yet learned to cope with, the knowledge explosion of the postwar era. Librarians, as intermediaries between the repository and the user, must find the way to cope.

When I began my career as a historian—less than three decades ago—my environment was little different from that of my teacher and his teacher when they commenced their careers. I could create my own basic professional library. Standard works printed in the eighteenth century were still easily acquired. I could receive a catalog, order some books, wait six months, and order again with almost equal success in finding what I wanted still available. Now, all but the newest books have virtually disappeared from the market. Scholars beginning their careers can no longer have their own libraries. They are dependent more than ever on librarians and library resources. The number of individuals in most fields has increased exponentially.

Humanists are traditionally the heaviest library users. Yet the retrieval for new titles and articles is still antediluvian in contrast to many science specializations. Can we not devise some more sophisticated way to inform appropriate readers of the existence of new publications relevant to their work? Should I not be able to call up an index, enter codes to define my interests, and browse online to determine if new publications, especially articles, are of interest to me? Then can I call up the text?

Let me be more specific. It has long been forecast and widely accepted that texts will circulate in forms differing from the traditional printed medium that has been standard from Gutenberg's time to our own. I have suggested that libraries will be increasingly unable to supply printed texts in demand by readers—whether artifacts of the past or some of the flood of new publications that has characterized our world in recent years. Yet readers must have them. The artifacts of the past will be accessible only in some type of reproduction. Even the libraries that possess the originals will determine that their rarity and vulnerability to repeated use prohibits free access to the past. Reproductions must be the answer. Since World War II the preferred format has increasingly been microfilm and, more recently, microfiche. Reprints, the favored medium of the 1950s and 1960s, are now too expensive. Microforms raise new problems of access, since often they are not fully cataloged.

Then there are the texts that are themselves available in machine-readable form. I suspect their number will increase rapidly. Surely with all the research being conducted on artificial intelligence, and with the perfection of the optical character reader, we will find it possible to convert texts to machine-readable form quickly, accurately, and cheaply. It may even be possible to make that conversion from microform so that the substantial volume of material now existing in that form can be translated to a more modern storage and reproduction method.

There are many projects in this country to establish database text centers. Oxford University has a model center. To what extent will the titles of the pre-1985 world press be accessible in machine-readable form by 1995? How will readers be directed to them? Indeed, how will one be able to master their nature, contents, number, and access so as to be able to impart that information to others? Will data or texts available only in machine-readable form be harder or easier to access? Boolean searches permit analyzing

the full text in a bewildering variety of ways. Subject indexes will be rendered superfluous by word and phrase searches. But will the database be so monstrous that these searches, theoretically possible, will be rendered impossible because of cost? Or will we have the expertise to design the searches?

As I was writing this paper, I discussed on the same day with three different colleagues the need for a program to evaluate and collate Persian texts; the work of a classicist comparing up to five hundred manuscripts of a given classical text to determine priority, reliability, and similarity; and a Swift scholar's use of the computer to establish definitive texts of his poems. Who is going to identify the databases that contain their texts? Who will advise them on the proper software to carry out the research? Who will train them in the use of the software?

I have been discussing texts and their production. What of the statistical and other databases our colleagues consult? My college maintains membership in the International Consortium for Political Science Research (ICPSR), yet it is consulted by faculty throughout the university and also by users off-campus. Who should maintain these data sets, order new ones, inform the faculty of their existence, and make them accessible to others? Our social scientists are demanding access to ever more data sets of this nature. Who will pay for it? Who will arrange for them, store them, provide access? If the library is an information center, is that not its job? If the work is downloaded to a personal computer, how is that managed and controlled? Can it all be done remotely, without the individual requiring service entering the library?

What about nonstandard, private, or governmental databases, neither created for nor intended for researchers, but obviously of great value. My wife wants to do a study of hospitalized adolescents for her doctoral dissertation. In 2000, will a librarian be able to tell a student what kind of private, confidential databases for studies such as this exist, how they are organized, how they may be accessed, and how they may be downloaded and analyzed? Can we do the same with student records and with court records? Will they all be organized using the same programs or standard courses so that they can be compared?

I hear a lot of talk about electronic mail and bulletin boards. Is this, too, a library function? How are they identified? How are they accessed? Can the library pay an institutional membership or fee so that all members of the institution can access these at will? How are we going to determine and pay access fees and royalties or determine and protect copyrights? By making photocopy machines freely available in libraries, have you already provided an answer?

Several years ago I was working with an English art dealer on the possible purchase of a painting for our university museum. While in The Hague I consulted the files of the National Center for Dutch Art and was able to trace three other versions of the same scene by the same artist, each on a different type of material—copper, cloth, and wood. Why was that information not available from my university library? Will it be in the future? Can I then also order color images, copies of the paintings to enlarge and compare? Will a librarian help me?

I spoke about the antiquated state of libraries today. Books are still stored on shelves by people, paged by people, misshelved by people, vandalized by people, and lost by people. Accessibility to journals is still often limited, during the first months of their residence in our collections, due to the lengthy process by which we segregate and guard them when unbound, then allow them to languish for months in binderies. At the same time we must recognize that the useful half-life of periodicals in some fields is a matter of months rather than years. I assume this is why periodicals are not sent to the bindery the moment all issues that make up a designated volume are received.

Do we distinguish between fields in setting the schedule for the trip to the bindery? Books, too, are often tied up interminably in processing. When processed,

they are sometimes only brieflisted by untrained clerical help, so that even the minimal records created and inserted in the card catalog are inadequate for retrieving the book. First, LC cards and then central cataloging systems made the creation of cards easier, but there is still the wait for delivery and the use of the postal service, which becomes less rather than more efficient.

When I go to the supermarket, the clerk runs an optical character reader pencil over a bar code on the label, which automatically enters the item description and current price in the register and deletes the item from the store's inventory. A similar unit, linked to the in-house automated catalog, can now be used at the circulation desk for check-in and checkout. But the bar code has to be separately prepared and inserted in each volume. Why do we not insist that publishers include a bar code below each ISBN number on the back of the title page? Why could not a similar unit, reading ISBN numbers linked to RLIN, initiate and even complete the cataloging process for a library?

If we want to borrow on interlibrary loan, recourse to an OCLC or RLIN central data bank speeds the location of a copy, but the notification, manual retrieval, and delivery is the same old, slow process and is subject to all the usual human errors. (So I discovered last month when I received a title similar to but not the same as the one I ordered. I first inquired after the item in July. I was still waiting for it four months later.)

Most journals are read by a very small number of people. The demand for copies of articles is so limited, except for a handful of widely consulted journals, that the National Library of Medicine once informed me that they could and did cut out the article and send it to the requester—there was so little likelihood of a second query. Increasingly we set type from tape or have access to sophisticated and efficient optical character readers: could not all requested articles or book extracts of twenty-five pages or less be sent by electronic means directly into the requester's home or office? Could not NLM or LC read every roman-type journal into its database and then make these electronically stored texts available by this means?

But I stray from my charge—or my audience. The library may have already solved some of the problems I have described. Certainly librarians are working on solutions. Indeed, I think they must be initiators, not responders. They must help us to solve the crisis that faces our libraries. They must help us identify the problems and establish the priorities for solutions, then enable the users to access the information they need. This task is a daunting one. The library must embrace the new technology and become its exponent. The environment will finally leave the Dark Ages, if not the Stone Age, and become sophisticated and automated to an extent never dreamed of even a decade ago. The heaviest and most demanding library users, the humanists, are the least well trained and the most difficult to train. Librarians must lead us into this new and exciting world.

Meeting Scholarly Information Needs in an Automated Environment: A Humanist's Perspective

David Crawford

Probably most humanistic academicians today use word processing, but this does not assure that we will quickly move on to higher forms of automation. Humanists who care about language can be repulsed by awkward, poorly organized, and jargon-ridden discourse and documentation; they will also expect automated access to information to seem as simple as earlier methods of inquiry. Nevertheless, many private databases—surely in the thousands—in the humanities are now being developed. The most pressing need confronting those scholars is to create a means of communication that effectively transcends disciplinary boundaries.

Many of the current questions about evolving technologies and future library services emerge because technological progress can bring with it a complex of nontechnological problems. Perhaps the proper task for a humanist here is to focus on one of those inconvenient nontechnological problems—some of the people who will use the machines. As you adopt more technology, you will encounter the need to introduce users to the new processes. Your role as curators of knowledge seems to be taking on a new dimension. Now part of that knowledge, rightly or wrongly, is technology itself, and you will find yourselves teaching others how to use it. Effective teaching includes considering the attitudes and skills of those who must learn, so my first step will be to discuss some humanists' perceptions of evolving technologies. Then I will illustrate some of their applications of automation and, finally, offer some of my views regarding technologically enhanced library services.

Humanistic academicians easily recall the euphoric literature of the 1960s. Our thinking of that decade evidently oversimplified the degree of intelligence that lurked behind humanistic expression. Contrary to some expectations at that time, such operations as translating languages, writing good poetry, or composing symphonies in the style of Beethoven have continued to confound the programmer's art. In the course of more modest triumphs we have also seen colleagues suffer through some ambitious and expensive failures. As a consequence, many of us have become more cautious over the past twenty years. Before investing energy and resources into an evolving technology, we want to be convinced that

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the investment will be repaid, preferably with interest.

Surely a large majority of humanistic professors now use a computer for word processing, and we all know of some whose computer applications are truly impressive. But of those who work with computers, only a few, perhaps 20 percent, use their machines for anything more than typewriters. How quickly, or slowly, academic humanists will respond to the potentials of other new tools is difficult to predict. Answers will be related to their perceptions of the new processes. How much time must we invest in order to learn them? Will they really make our work better or more efficient?

We want to think that successes in word processing will encourage humanists to explore other technological applications. However, even word processing can lead to mixed perceptions because, to many humanists, the coin of the realm is language. Humanists who are drawn to word processing because it facilitates their use of language are also the people likely to be offended by the abused language they encounter. After plowing through some manuals on hardware, the documentation of software, and dialogues with vendors and other advisors, a humanist can logically conclude that:

> [What is needed is] a kind of discourse accessible to many humanists that combines the authority of tone and clarity of expression that will catch his or her imagination. To a certain kind of humanist, jargon of any kind is a signal that the writer does not command sufficient precision of expression and depth of understanding to go beyond that rather pat phrase—or other phrases that seem indifferent to shades of meaning and implication in language, reducing expression instead to pre-packaged formulas. . . .
>
> I sense some humanists shrinking from technology because, at least in part, they don't trust the sensibilities of those who are urging them to jump in the fray. Now of course, this is not necessarily the cheerleader's fault. Many humanists are timid by nature when it comes to technology, intimidated by gadgets, afraid of looking silly, not ready to endure the egobuffeting that taking ten steps backward can bring, and perhaps a bit snobbish about old-fashioned ways. But their hesitancy, I think, has a core of common sense about it, too. It's also a challenge to the technologists to assimilate their skills and to translate them convincingly into an acceptable form of humanistic discourse. The appearance of computer jargon shows, to some people, that the message has not really been assimilated and the common ground does not yet exist.[1]

To put it another way, a humanist who interfaces with cybernetic processing is accessing a miniworld containing parameters of linguistic inelegance that possess the undeniable potential of arousing various negative responses ranging from a certain degree of suspicion to outright anger.

Humanists might be addressing this issue more effectively than we now do. Paradoxically, disorganized and poorly written documentation is commonplace at a time when universities graduate scores of trained and talented writers unable to find employment. Some restructuring of curricula for composition majors might help supply better technical writing. One of the issues you face now is the idea of integrating the library and the computing center, and I urge that writers of professional quality be added to the picture. One of the positive by-products of new technologies is that they can encourage us to reconsider the institutional barriers that separate minds from each other.

DATABASES MADE BY INDIVIDUALS

For some scholars, the thrust of humanistic research has been changing over the past two decades. Interest in heroes and geniuses is still in place, but now we are also asking about the daily lives of more common people. Consequently, information needs now differ from what they were a generation ago. This change brings us closer to the social sciences, quantitative methodology, and the computer. If computers have disappointed some humanists because of what they were unable to do, we, like librarians, have also learned some important lessons about what computers can do well. Although only a minority of us is active in building databases, such projects are now rapidly increasing in number. Database management opens the doors for many different

types of humanistic inquiry, including the ability to analyze the happenings within a full community or even a civilization. Some humanists' databases are bibliographic projects to assist in searches; others are conceived to analyze the correlations between variables in the data. Following are three illustrations of databases being developed now by individual musicologists:

1. I am making what appears at first to be a bibliographic database for searches, Renaissance Liturgical Imprint: A Census (RELICS). My initial purpose was to locate the sources of the raw materials (chants and texts) that composers used in sacred music. RELICS now contains about twenty-four hundred and fifty records and will probably grow to about seventy-five hundred. Each title is described by up to twenty-one fields so that I can search for generic titles, ranges of publication dates, printers, cities where printed, countries of intended users, dioceses, rites, and monastic orders. Boolean operators permit extracting any combination of these variables. RELICS also informs me where to find a given book locally or in other libraries. Future work, in addition to adding more titles, should enter the usual bibliographic citations, formal physical descriptions, and descriptions of manuscript addenda.

Although conceived as a tool for bibliographic searches, when RELICS's sampling more fully represents the subject, the database can provide useful correlations between data. For example, from what foreign printers did the clergy of Spain, England, or Yugoslavia get their books? How do individual printers or cities compare in book production? What are the chronological fluctuations? Which dioceses or monastic orders took kindly to the early printed book, and which did not? Once number-crunching of this kind is done, we may have clues that lead to more secure interpretations.

2. My colleague, Dale Monson, is building an Eighteenth-Century Opera Database (ECOD) from information in printed opera libretti (booklets of opera texts) of the period. ECOD now includes about twelve hundred *libretti* and could grow to as many as sixty thousand. Although Monson can produce a bibliography of libretti, his real purpose is to reshuffle the data. ECOD's structure is complex. Each libretto is described by over one hundred fields, and this would normally impede data entry. Monson solved the problem by writing a program for a microcomputer. The data are entered at the micro, which provides friendly prompts, and restructures the data so they can be telephoned to ECOD's big appetite. ECOD's power is illustrated by its ability to answer questions such as the following:

> What is the performance history of a given theater? Were certain singers often cast together? When, where, and in which roles? What set designers worked in Venice? When and for which operas? When and where did the known performances of a given opera occur? Where can I now find all known libretti printed in Naples? When and where did performances of libretti by Metastasio take place?

3. A different kind of database is being developed by John W. Hill at the University of Illinois. Turning his attention to compositions from 1600 to 1800 that warrant a modern edition, Hill encodes the music in the PLATO system. The music can then be displayed on the screen, printed by a good-quality dot matrix printer, or heard through a synthesizer. If users wish to perform the music, individual performers' parts are printed automatically. Unlike many databases that permit the storage and retrieval of information in alphanumeric code, this output is graphics or sound. Distribution is available on PLATO terminals linked to the University of Illinois Computing Center. Communications costs are expected to fall within a few years, because PLATO is installing microwave satellite communications that will connect to existing cable television systems. Hill's project offers some significant advantages over more conventional means of music publishing: (1) purchasing prices may be reduced, (2) no library shelf space is encumbered, (3) the music can be heard as well as seen, (4) error-free performers' parts are available, and (5) delivery time is a matter of seconds rather than weeks or months.

With these three examples in mind, we

can now turn to the issue of standardization. Monson's project employs a locally developed utility system on one of our campus mainframes,[2] but his data are easily rolled over into formats acceptable to other systems such as dBase III. Therefore the information can be processed on some personal computers as well as numerous mainframes connected to a telephone. RELICS is driven by SPIRES, a mainframe system widely used for bibliographic projects.

Monson and I are using orthodox methods to answer orthodox questions, but Hill's project requires users to employ unique hardware in order to enjoy unique services. The problem of standardization is to try to strike a balance between what might appear to be two forms of intellectual censorship. In the case of Hill's project, the freedom to invoke atypical methods is justified because it delivers unique and useful services. On the other hand, many other technological incompatibilities are unnecessary; my inability to read an incompatible database impairs my freedom of inquiry. If we are to succeed in distributing information to humanists electronically, unnecessary inconsistencies must be discouraged.

These three illustrations have not been formally announced in musicological literature, so they bring to mind another problem that might be solved in a more specific manner. No one can guess how many other private databases in humanities are now being built in the country today, but the total is surely in the thousands. Even though the journal *Computers and the Humanities* is helpful, there exists today no truly effective means whereby humanists can inform each other of their work with databases. Even the communication within a discipline can be faulty,[3] and communication between members of different disciplines is more problematic. How can I make RELICS compatible with the research of someone else working on early printed books? How can Monson synchronize his efforts with someone working on Italian literature?

The most pressing need involving humanists and technology today is to develop an effective flow of information between scholars. Such traditional media as the journal and the monograph are declining in esteem for several reasons. First, these forms of publishing involve time delays that technology has now rendered unnecessary. Such delays are particularly troubling because research seems to be executed faster now.

Thanks to word processing, scholars spend more time in research and less in clerical toil. One fast-moving piece of research ideally influences someone else's work, but that ideal can be thwarted by the bottleneck at the publisher. Secondly, database management is changing some perceptions about publishing. We used to embark upon a project and then eventually reach the fateful day when we had to declare the work finished and ready to be frozen forever on the printed page. Now, however, a database, even one that offers a fragmentary sampling of its subject, can be distributed online or on a print-to-order basis, thereby aiding other scholars. More complete databases can continue to enjoy refinements or expansions into related subjects. Many of us regard various types of humanistic research as ongoing processes and attitudes that resist the artificial categorizations of "in process" or "completed." The new medium, electronic distribution, can help us transmit information in accordance with that attitude.

Humanists need an umbrella organization, perhaps supported by NEH or ACLS, and it might be implemented through the information networks being put in place by RLG. Something like a national database of databases, distributed through RLIN, would be a helpful first step.[4] If this could be developed, several further possibilities emerge.

1. Scholars who happen to be building compatible databases will know of each other's existence and can exchange data on disk or through telecommunications. Scholars with incompatible systems can at least exchange hard copy.

2. Needs might be defined to locate facilities for translating data from one format to another.

3. We will be in a more knowledgeable position to consider standardizing data formats and search protocols.

4. If a degree of standardization can be achieved, some scholars might be willing to release their databases to a central depository where they can be distributed as public domain electronic data. ECOD and RELICS, for example, will eventually be valuable enough to warrant online distribution. This could be done at our computing center, but many users across the country are accustomed to the protocols and accounting methods at other installations. Such complications should be unnecessary; we have returned to the call for standardization.

PUBLIC DATABASES AND SERVICES

The emerging online catalog will alter the work patterns of scholars who have electronic access from remote sites. Such users will welcome the full range of services that can be provided: learning the actual location, charge status, or acquisition status of a book; putting a hold on books charged to other people; linking to catalogs at other institutions; filing interlibrary loan requests; and initiating the paging of books from distant storage locations. Also, the physical delivery of volumes to someone's remote location, a service being developed in some libraries, is conceptually related to an ability to request the item while at a remote site.

But not all is rosy, because of user-oriented issues that jeopardize the returns on your frightfully large investment. For many humanists, the online catalog will be the first hands-on experience with telecommunications. They will not want to spend time studying documentation, and they will not want to learn new protocols when their screen lands them in a different library's catalog or when they travel to another library. In other words, they will want to be convinced that the online catalog represents an improvement over the well-known and standardized card catalog. A consortium of research libraries developing online catalogs is in a good position to insist upon friendly programs; to develop clear, well-written documentation (or, better yet, menu-driven programs); and to promote standardization protocols. These are prerequisites for comforting the scholar who is devoted to subjects other than computing for its own sake. Our present failures to achieve these goals are understandable consequences of technology's recent history. Future failures, however, may reflect a shortfall in thinking and organization, not in technology. I fear that the more we automate, the more expensive the process of standardization will be, whenever it finally does emerge.

When turning to another kind of public database, the discipline-oriented bibliographic one, surely it is unnecessary to repeat the plea for standardized protocols with these projects. As we move more and more toward putting the user in the hands-on position, some faculty and students may express a need for formal training or counseling. If such services seem necessary, they may be treating the symptom rather than the disease. A humanist, no matter how uninitiated, is likely to believe that the logical operations involved in reading a bibliographic database should appear simple, resembling those required for reading a card catalog. If our tools obscure that simplicity, the design of the tools should be reconsidered.

Another cautionary note needs to be kept in mind with regard to the discipline-oriented bibliographic database: not all disciplines are similarly well served by the databases that presumably support them.[5] Books, editions, and journals are dutifully reviewed in a discipline's literature, but public databases seem to be subjected to less critical review, if any at all. If a given discipline neglects to review its bibliographic databases, perhaps such evaluations could be undertaken jointly by librarians and individual representatives of the discipline in question. Qualitative evaluation is a daily problem in book selection departments, and we can expect it to extend to databases as well. The issue may become more acute as these databases become more integrated; a user familiar with one discipline may be more frequently vulnerable to assumptions about the integrity of databases in other disciplines.

Many of us regard bibliographic databases as providing screen displays or hard

copy, but we can expect a growing interest in writing the output into mainframe files or on floppy disks. This interest will be stimulated by the increasing access from remote stations, because scholars will wish to build their own bibliographies more efficiently and accurately. RELICS, for example, would have benefitted from the data already machine-readable in such databases as RLIN and OCLC.

Although the relationship between information needs and library services largely involves database resources, some attention might also be directed toward electronic mail. Academicians often communicate electronically and so do librarians, but I wonder how often the two parties talk to each other through their modems. The need to appear physically at a librarian's office for routine dialogue results in undue congestion; it is inconvenient, and it is often badly timed for at least one of the parties involved. Some users would appreciate being able to use modems to consult reference and circulation desks as well as officers such as those in charge of book selection, cataloging, and public databases. Also, the ability of library staff to handle routine exchanges with users during off-peak hours may contribute to using staff more efficiently.

Promising though local electronic mail is, the possibilities increase when we add existing national and international networks to our thinking. While we wait for the expansion and refinement of online catalogs, we should keep in mind that it is economically feasible for me to be online to virtually any librarian in the country. The international dimension is especially valuable to humanists, for many of our important sources are preserved abroad. Not only would this service be useful to many humanists, it would also provide a simple and instantly rewarding exercise in the world of evolving technology.

CONCLUSION

Evolving technology holds great promise for helping meet the information needs of humanists, and in only a few exceptional instances, if any, can we believe that its potentials are fully realized. In many cases, the technological advances of recent years have outstripped our ability to install comfortable handshakes between the machine and the user. Research libraries, being drawn inevitably into technology, need users who can invoke the new tools. People will accept these changes more gracefully if they are greeted by friendly programs, lucid documentation, standardized protocols, and compatible databases. We will want to see that the former logical and simple methods of locating information are replaced by new tools that appear equally logical and simple.

REFERENCES AND NOTES

1. I quote a letter of October 9, 1985, from my colleague, Profesor Richard Crawford, who was responding to a preliminary version of this paper.
2. The TAXIR system was developed by Bob Brill of the U/M Computing Center. We gratefully acknowledge the center's assistance with hardware and software and also the graduate research assistanships from the School of Music.
3. For example, in 1982 some members of a national learned society in humanities requested the formation of a committee to serve as a clearinghouse for information about computer-assisted research. Although the proposal was simple and almost without cost, the board of directors denied it after two years of discussion.
4. What is suggested here at the national level has already been discussed at a local level. See the promising *Final Report* (April 4, 1985) of Columbia University's Data Base Policy Committee.
5. For example, I recently asked my colleagues in Michigan's musicology department about the online database in music. Of the ten of us, two had seen it demonstrated, but no one had actually used it for his or her work, and no one had advised students to consult it. Since this database now has a performance record of more than a dozen years, its promise for the future seems cloudy.

Evaluation of the Public Service Functions of Serial File Systems

Elizabeth Hanson and Judith Serebnick

This study presents a methodology for describing, analyzing, and evaluating the public service functions of serial file systems, with emphasis on evaluation. The system in a university departmental library is analyzed, and a user study is conducted to identify successful and unsuccessful search patterns of a group of students who have not used the library previously. The user study employs citations, questionnaires, interviews, and critical analysis of 130 factors related to selected variables to determine the efficiency and effectiveness of the system. The methodology employed is potentially useful for bibliographic instruction.

In many library settings, a serials known-item search requires a patron to consult a complex network of bibliographic and holdings records reflecting a unique compilation of cataloging codes, holdings statement standards, and in-house technical services policies and practices. This record network is organized into a cluster of separate and often single-purpose files that include information on current issue receipts, bound volume holdings, and claims, bindery, and other processing activities. The patron can access some files directly, while others are consulted by library staff on behalf of the patron. In most libraries, this serial file system includes the union catalog, shelflist, serials check-in files, a variety of in-process records and, in many cases, a separate list of serials holdings.

The investigators who undertook the project described in this paper were interested in exploring the overall question of how the public service functions of such systems can be defined, described, and evaluated. This process begins with a library delineating what patron-oriented functions it has assigned its serial file system, specifically or by default, and then proceeds to a description of the system and, finally, to an evaluation of how well the system fulfills its public service responsibilities. The current study focuses most specifically on the evaluative facet of this process. The intent is to suggest a useful approach toward the evaluation of current systems, either to improve their effi-

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ciency or to redesign them in anticipation of an online serials control system.

The utility of this exercise seems clearly indicated by previous studies, which show that library users are often thwarted in their search for serials and monographs, and that accessibility problems frequently outnumber acquisitions problems.[1,2,3,4] Also, there is considerable evidence that many library patrons will not seek assistance from library staff when they run into trouble—in fact, many do not even realize that they are in difficulty.[5,6,7]

Thus, previous research provides a strong impetus for the examination and evaluation of serial file systems and indicates that one key requirement of an effective system is that patrons find it easy to use. W. F. Lancaster goes a step further to assert that: "Evidence suggests that perceived ease of use may be the major criterion considered in selecting an information source and the overriding factor influencing whether or not a particular information service is used."[8] However, ease of use has seldom been treated as a variable in systematic descriptions and evaluations of serial systems.

RELATED RESEARCH

Beyond providing a rationale for the study, previous research was of limited usefulness. The investigators conducted an extensive computerized and manual literature search focusing on patron use of serial systems and, in general, the application of systems analysis techniques to libraries and library use surveys. Through Dialog, the ERIC, LISA, and Soc Sci Search databases were searched. ABI Inform was considered, but a preliminary search indicated that a full search was not warranted. *Library Literature* and bibliographies by Tuttle,[9] Pan,[10] and Pitkin[11] were analyzed manually. Only a small body of literature seemed even peripherally relevant. Works by Adalian, Rockman, and Rodie,[12] Golden, Golden, and Lenzini,[13] Melin,[14] Murfin,[15] Penzelik,[16] and Whitlatch and Kieffer[17] were most useful in suggesting areas of investigation and methodological considerations.

Majorie Murfin's study "The Myth of Accessibility: Failure in Retrieving Periodicals"[18] served as a major departure point. Her study was designed to determine "how many patrons failed to locate periodical issues for titles to which the library subscribed" and "what part of the failure was solely the library's responsibility . . . and what part was due to user errors."[19] Thirty-one undergraduate students in a basic reference class were each given five citations drawn from 252 *Readers' Guide to Periodical Literature* citations. The students had one hour to retrieve the articles, all of which were in journal titles held by the library. Subsequently, they reported the results of their searches and filled out a questionnaire that inquired about their search strategy, their understanding of library terminology, and so forth. A check was then made of all citations to determine if the failures were the responsibility of the library or of the user.

Murfin's results showed that 55 percent of the 155 citations were retrieved by students. Of the 45 percent not retrieved, 15 percent were judged to be due to user error, and 30 percent were attributed to library problems (broadly defined). Content and use of a directory of periodicals, library operations failures, and physical separation of the microform and bound volume collections contributed to a high proportion of the user errors.

PARAMETERS OF THE STUDY

As the current study progressed, the investigators asked questions similar to Murfin's. How many patrons fail to locate materials that are in the library, whether on the shelf or in a temporary location such as a carrel? How many fail to gain information about the status of materials that are not currently in the collection, e.g., on claims or at the bindery? When a patron finds neither material nor information, are these failures due to user errors, or are they the library's responsibility? Additional questions came to the fore. If patrons are successful in locating materials or information, what are the reasons for their success? What search strategies are used by successful and unsuccessful searchers? How do patrons approach a search for serials in a library they have not

used previously? How does the organization of the serials file system relate to the patrons' search strategies?

By designing a study to describe and evaluate the public service functions of serial file systems, the investigators sought to test a potentially useful evaluative methodology in a small-scale context that would allow for a carefully controlled study. They opted to focus on access to serials in the Geology Library of Indiana University Libraries, Bloomington. This medium-sized branch library occupies part of the sixth floor of the Geology Building and functions as a unit of the centralized university library system. It houses a collection of seventy-five thousand monographs and bound serial volumes. Through subscriptions and an extensive exchange program established by the Indiana Geological Survey, it maintains a serials list of 1,365 currently received serial titles. All cataloging services and acquisitions activities are provided by the centralized technical services units of the Main Library. A high proportion of its clientele consists of Geology Department students and faculty and survey staff members, but students and faculty from other departments also use the library. The staff consists of one professional librarian, two full-time support staff members, and two FTE part-time student assistants (usually eight students each academic term).

The Geology Library was chosen as the site for a number of reasons. It has an extensive serials collection and a well-developed and efficient technical services operation that is large enough to sustain an extensive analysis. Also, the librarian has a strong commitment to high-quality public service and was willing to lend support to the study. She provided invaluable assistance and advice throughout the project.

It is important to emphasize that the investigators wanted to evaluate the serials file system independent of its present use. This approach has distinct advantages, as W. F. Lancaster and Deanne McCutcheon point out:

> in terms of assessing the value of the library as a service to the entire community, concentration upon the present users gives, in many ways, a distorted picture of the success of the library. . . . If we always evaluate library service in terms of the expressed needs of the present users, then as a result of our evaluation, when we attempt to improve the service, we tend to move the library service toward the demands of the present users, and away, perhaps, from the unexpressed needs of the users and the needs of those who are not presently using the library.[20]

DESCRIPTION OF THE SYSTEM

The serial file system of the Geology Library needed to be carefully analyzed and described before being evaluated. The investigators first constructed a map of the library that graphically depicted the entire system and identified its individual component files within the context of the overall physical layout of the library. The map is reproduced at the end of the article as a reference for the following discussion.

The library is generally well laid out. The circulation desk and card catalog are visible upon entering the room, and the stacks area is well arranged with clear signs at the end of the ranges. However, the current issues section is not visible from either the entrance, the circulation desk, or the card catalog. Also, although the computer printout of serial holdings is located on a stand directly across from the circulation desk, there are no signs directing patrons to its location.

Secondly, a description of each component file was drawn up, with emphasis on content and function. The files are as follows:

Card Catalog—A dictionary catalog of all cataloged materials in the Geology Library including records of serial bound-volume holdings. These are reflected in several ways including the ticking off on date cards of new volumes received or the penciling in of updated holdings on unit cards. Some additions such as extra cross-references have been made by staff in recognition of the special needs of their clientele.

Shelflist—A standard shelflist of Geology Library holdings that reflects serial bound volume holdings, some bibliographic information regarding title changes, etc., and certain detailed loca-

tion information, e.g., titles shelved in the storage area, etc.

Computer Printout—A listing of all serials received by the Geology Library via the Main Library's Serials Department. Titles currently received but not yet cataloged are noted as *NEW*. Newly assigned call numbers are written on the printout by Geology Library staff pending receipt of an updated copy. This is the only public-access record of newly received serial titles.

Kardex—Contains receipt and claims records of all serials (journals, monographic series, conference proceedings, annuals, etc.) received on an ongoing basis in the Geology Library. New serial titles, including those yet to be cataloged, are entered therein.

Order File—Includes records for serial backfiles being purchased.

Circulation File—Includes records of all serial volumes sent to bindery via the Main Library's Preservation Department, checked out for use in a carrel or to a faculty member, or on reserve for a course.

GEOLOGY LIBRARIAN'S VIEW

The geology librarian was asked to describe in detail how she believed patrons located serials in her library. She postulated that the search pattern of new patrons was:

1. Patrons usually go to the circulation desk first and normally ask for either the card catalog or "periodical file" (meaning a card catalog just for serials). The desk attendants send patrons to the card catalog or to the printout of the periodical file.

2. The patrons check the card catalog or the printout.

3. When they have found the titles in either of the above, they return to the desk and ask where the periodicals are. Experienced library users ask where bound volumes or current issues are if they believe they can tell in which section their titles are located.

4. The desk attendant is expected to tell the patrons that "bound volumes are in the stacks and current issues are over there" (gesturing toward the current-issues section).

5. If the patrons do not find the material, approximately 75 percent go back to the desk, where attendants will attempt to determine if the materials are bound volumes and will check the circulation file under the call numbers to see if the volumes are checked out to the bindery, to a faculty member, or for use in a carrel. If in a carrel, patrons are directed there.

If it is unclear whether the material is bound, the attendant asks if the patron looked in the current issues section. If yes, the attendant checks the kardex to see if the material has been received and if so, searches the library tables, etc., to try to locate the items.

METHODOLOGY

As indicated above, the investigators wanted to determine the overall rate of success and failure of library users' known-item searches for serial literature. They also sought to identify patron and library-related factors that contributed to this success or failure. They planned to reconstruct the search strategies employed by both successful and unsuccessful participants and to analyze these in relation to the operation of the library's file system. How well the organization of the file system relates to the strategies employed, which facets of the system work well, and which need to be improved were key questions.

Early in the study, the decision was made to conduct a user survey broadly based on the one in Murfin's study. The student participants, both undergraduates and graduates, would be given citations to serial articles and asked to locate the cited articles in the Geology Library. The students would not have used this library previously, and the desk attendants would not be informed of the study.

The geology librarian searched the GEOREF database and identified one hundred randomly selected citations to articles in a wide variety of serials covering an extensive time period. These were largely English-language serials to which the library subscribed. Each citation was searched to determine the status of the volume or issue that included the article and the ease or difficulty of locating it. For volumes and issues not on the shelves, the

searcher verified that the circulation desk or kardex files showed that the items were at the bindery, on reserve, in a carrel, or on claim. The approximate time required for the search was also recorded.

Subsequently, each search was rated as easy, medium, or hard using the criteria shown in table 1.

A written questionnaire was developed to elicit information about the students, their search strategies, and their use of the serial file system. Some variables were chosen from previous research, e.g., class rank, frequency of library use, and amount of instruction in library use.[21] Though previous findings are not clear-cut, it was expected that higher class rank, more frequent use of libraries, and more intensive bibliographic instruction might relate positively to success in finding citations.

THE PRETEST

The next step in the investigation was to conduct a pretest using eight students, four undergraduates and four graduates, who were identified as articulate individuals with good analytical skills. The purposes of the pretest were (1) to test procedures developed for conducting the user survey, (2) to test the questionnaire, (3) to determine if participants could be observed unobtrusively, in order to chart their search strategies, and (4) to gather information helpful in determining the optimum size of the citation list given to each participant, the number of participants, and the length of a search session.

Two versions of the questionnaire were used: one included all the questions in a written format; the other presented two-thirds of the questions in a written format and the remaining third in a structured interview. The investigators wanted to determine if an oral interview would elicit information not easily included in the written form.

Each student was given ten citations—four easy, four medium, and two hard—and was told to use a "normal" search strategy—one the student ordinarily used to locate serials—and to feel free to ask for assistance from the desk attendants. The format of the citations was not explained in detail, but it was described as including the author and title of an article and the title of the serial that contained the article. Students were allowed forty-five minutes to locate the ten citations and approximately twenty minutes to complete the written questionnaire and interview. Each student was asked questions relating to the effectiveness of the pretest methodology.

The pretest provided invaluable information. The most important finding was the individuality of each student's search strategy and response to questions concerning ease of use of the file system. The validity of the citations and questionnaires and the usefulness of a structured interview were established. However, it

TABLE 1
CRITERIA FOR RATING SEARCHES

Level	Criteria
Easy	Title was located quickly in the card catalog. Bound volume containing the article was found easily in the stacks area or Article was in a 1984 unbound issue—this was the most recent year for the citations in the study. Search was estimated to take less than five minutes.
Medium	Serial was published in a foreign language (but author and title were in English in the citation) or Serial title began with an initialism or Article was in a 1982 issue that was still shelved with current unbound serials.
Hard	Issue or volume was in a carrel, sent to the bindery, on reserve, or being claimed, thus necessitating that the patron get information from the desk attendant or Article was in an uncataloged serial, thus necessitating use of the computer printout.

proved impossible to observe the participants unobtrusively without alerting the desk attendants to the investigation, and the decision was made to forego such observation.

The most unexpected finding was that students had difficulty locating unbound current issues. This may be explained by the fact that many students had previously used only the Main Library, where unbound periodical issues are located below street level. There are no bold signs directing patrons to this room and unless they are somehow informed, patrons may not realize that the Main Library separates unbound issues from bound volumes.

Probably the most important result of the pretest was that it encouraged a sharpening of the survey's focus. The researchers had envisioned that the user study would involve as many as thirty students, each of whom would be given ten citations. However, because the pretest highlighted the individuality of each student's response to the study, in-depth analysis of a smaller number of students seemed more appropriate than the shorter, more superficial studying and interviewing of a larger group.

THE FINAL STUDY

The final study was conducted in March and April 1985. Fifteen students were selected to participate, ten undergraduates and five graduates, none of whom had previously used the Geology Library or worked in a library. The selected students were among those who responded to advertisements on bulletin boards in dormitories and to investigators' visits to classes in folklore, business, and computer science. They represented a wide variety of majors, and each was paid five dollars an hour for participating. The ten undergraduates included six freshmen, one sophomore, two juniors, and one senior.

It was decided that each student participant would conduct six searches. Five citation packets were compiled: each included two hard, two medium, and two easy searches, and each was used by three students to allow for comparisons. The citations included articles in bound volumes, current unbound issues, items being claimed, uncataloged titles, and materials in carrels and at the bindery—regrettably, the investigators neglected to include items on reserve. Each student had thirty-five minutes to search for the citations and twenty-five minutes or longer to complete the questionnaire and the interview.

The investigators decided to use the long form of the written questionnaire and to supplement it with an interview that would seek additional information on search strategy; use of serial files; understanding of library terminology and practice, e.g., current periodicals, bindery; individual reactions to ease of use of the file system; and effectiveness of circulation desk assistance. A structured interview schedule including twelve questions was designed. Immediately before each student was given a citation list, an investigator checked the library to ensure that all the appropriate volumes and issues were properly shelved, and so forth. This was considered an important control factor because it ensured that searches would not become snagged on factors unrelated to the study.

RESULTS

In evaluating the results, a successful search was defined as one in which the student either retrieved the appropriate volume or issue or determined that the issue or volume containing the article was at the bindery or being claimed. Items charged to carrels were retrieved. All other searches were considered unsuccessful. As noted above, each student had 6 citations. A perfect score was labeled 6/6, and at the opposite extreme, a score of 0/6 indicated that no citations were found. Of the fifteen students, only one achieved a score of 6/6, one achieved 5/6, and five achieved 4/6. These seven students (47 percent) were labeled "successful participants." The remaining eight (53 percent) were labeled "unsuccessful participants"; of these, one student scored 3/6, two scored 2/6, one scored 1/6, and four scored 0/6. The fifteen students conducted ninety searches, of which 39, or 43 percent, were successful. As noted above, in Murfin's study, 55 percent of the 155 cita-

tions were retrieved successfully by students.

Were the unsuccessful searches due to patron errors, or were they the library system's responsibility? The answer to this question is not clear-cut. For example, it was not always possible to determine to what extent the library's public service staff contributed to user failures. Student testimony indicated that the desk attendants gave incorrect or unclear information on only seven searches, but several students did not receive the amount of service they requested, and other students could have been helped if the staff had noticed and responded to their perplexity and inefficient search patterns.

In some cases, the library and the patron shared almost equal responsibility for search failures. For example, in several instances both desk attendant and student failed to retrieve 1982 issues located in the current-issues section. Rather than assign failure responsibilities arbitrarily, the investigators critically analyzed a number of variables related to the patron and to the library system. These included desk attendant, card catalog, computer printout, stacks, current issues, retrieval of in-process or temporarily located materials, and physical layout, including signage.

For each variable, success and failure factors were identified from an analysis of the participants' questionnaires and interviews, and each was labeled a patron factor or a library system factor. For example, for the desk attendant variable, the success factors for the library system included "desk attendant conducted question negotiation" and "desk attendant instructed patron regarding the card catalog." On the patron's part, success factors relating to the desk attendant variable included "patron asked for assistance concerning a serial" and "patron asked for assistance in a knowledgeable fashion." The total spreadsheet included 130 factors relating to the seven variables.

The variables were analyzed for the successful and the unsuccessful participants, and the resulting spreadsheets were used as the basis for characterizing the searches and evaluating the serial file system. In supplying data for the spreadsheets, the investigators included only data that came directly from the participants' questionnaires and interviews. No attempt was made to second-guess a situation or its contributing factors.

The successful participants included the five graduate students, one senior, and one sophomore; the unsuccessful participants included two juniors and six freshmen. As expected, the successful participants were more frequent library users. Also, although all the students in both groups had used the Main Library, the successful participants were heavier users of the departmental libraries. In addition, six of the seven successful participants had received some bibliographic instruction at Indiana University, while only three of the eight unsuccessful participants had such instruction. Three successful participants had actively sought opportunities for bibliographic instruction, while no unsuccessful participant had done this. Thus, higher class rank, more frequent use of libraries, and more intensive bibliographic instruction distinguished the successful from the less successful group. With the small samples involved, tests for statistical significances were omitted, but it is interesting that the differences were those that were predicted.

Analysis of the desk attendant variable showed that each of the seven successful participants asked for assistance (100 percent), while seven of the eight unsuccessful participants did so (88 percent). However, while a similar number asked for assistance, the two groups differed widely in the type of aid sought, in how they asked for help, and in their interpretation and use of the information they received. For example, at least half of the unsuccessful participants asked for assistance in a vague fashion—several students told the desk assistant that they did not know what to look for, and others asked for help in finding books without understanding that they were searching for serials. The successful participants specified that they were looking for serials and posed their questions in a knowledgeable fashion. For example, if particular issues were not in the library, they asked the desk attendants

if the serials were at the bindery, etc.

It is worthwhile noting that during his interview, the student who achieved a perfect score of 6/6 commented that he thought the best preparation for finding information in a library was to "ask for help if needed." However, he added, "If you go up with a vague question, they'll say 'Go to the card catalog.' You won't get much help if you are vague." His comments were most appropriate for this survey. The desk assistant who ably answered his clear questions was the same individual who earlier had summarily told a vague student to "go to the card catalog."

For the card catalog variable, substantial differences between the two groups of students were apparent. The unsuccessful participants were hurt the most by the card catalog's exclusion of serials received but not yet cataloged. Only the computer printout records new serials received but uncataloged in the Geology Library. The failure of the library system to provide adequate links between the card catalog and other components of the serial file system contributed to failures for more than half of the unsuccessful participants and two of the seven successful participants. In general, the card catalog was more difficult for the unsuccessful participants to use. Also, half of the unsuccessful participants searched for at least one citation under the author and/or title of the article rather than the title of the serial.

As noted above, there is no sign in the library alerting patrons to the existence and location of the computer printout, even though this lists most of the serials, including uncataloged items, and gives call numbers for cataloged titles. The desk attendant told three students in each group about the printout. However, one of the unsuccessful participants still did not consult the printout, and another failed to understand its use.

The stacks in the library are well arranged and they have clear call-number signs at the ends of the ranges. Most of the successful participants commented on the signs, and four unsuccessful participants commented on them in a manner that indicated these markers may have been a factor in their successful searching.

A major failure factor for the unsuccessful participants related to the current issues variable. Six of the eight unsuccessful participants were unfamiliar with separate current-issues sections, and because each student had at least one and often two citations for current unbound issues, this lack of knowledge was crucial. Only one unsuccessful participant was directed to that section by the desk attendant, and she was given inadequate information about the purpose and use of the materials. The majority of successful participants were familiar with current unbound issues and either were told about the library's current-issues section by the desk attendant or observed the area when they walked around the library as part of their search strategy. In general, students in both groups were uncertain about the age of serials in this section. Some correctly interpreted the bound volume information in the card catalog records and assumed later volumes or issues were unbound or at the bindery. However, all students who had citations for 1982 unbound issues were surprised to learn that serials more than two years old could be in the current issues section.

None of the unsuccessful participants was successful in retrieving serials that were in process or in temporary locations, i.e., in a carrel or at the bindery. As noted above, citations for these serials were rated "hard," and a successful search required receiving correct information from the desk attendant. Most of the successful participants obtained the needed information after realizing that the items were not located in the stacks or the current-issues section. Also, the successful participants were more likely than the unsuccessful to be familiar with the bindery, carrels, claims, etc.

Few students commented on the library's physical layout. However, two successful participants did take self-directed tours of the library as part of their search procedures. Four students commented on the lack of directional signs, and two wanted a clearly visible map of

the library (a map is located on a bulletin board near the entrance to the library, but no student noticed it). Three successful participants commented favorably on the library's compact, open floor plan.

SEARCH STRATEGIES

The students' questionnaires and interviews provided extensive information on their search strategies. The data were analyzed to determine in what order each student progressed through the library's serial file system, at what point desk assistance was sought, etc. Table 2 indicates the search strategy of each student.

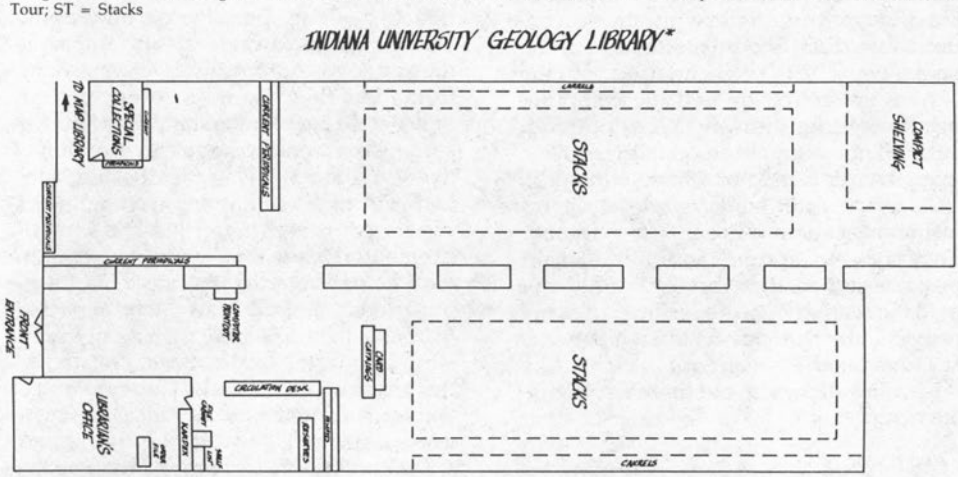
As shown in table 2, and figure 1, the search strategy of the most successful student, named Fred, is unique. Upon entering the library, Fred took a brief, self-guided tour; he "likes to wander," and it is his normal pattern to take a tour each time he uses a new library. He noted the current issues section as well as the stack area and the card catalog. Next, Fred went to the desk attendant and asked for "a list of periodicals in the library." When interviewed, he said that he would not start a search for periodicals at the card catalog; previous experience at Northwestern University and at other libraries had taught him that librarians often have a complete list of their periodicals. The desk attendant showed him the computer printout, which he had not noticed on his self-tour.

After he obtained the call numbers from the printout, Fred went to the stacks for the older items and to the current-issues section for newer ones. Last, he asked the

TABLE 2
OUTLINE OF SEARCH STRATEGIES

	Successful Participants (N = 7)							Unsuccessful Participants (N = 8)							
Order of Search	6/6	5/6	4/6	4/6	4/6	4/6	4/6	3/6	2/6	2/6	1/6	0/6	0/6	0/6	0/6
1	SeT	CC	CC	CC	CI	SeT	CC	CC	CC	CC	CC	CC	CC	DA	CC
2	DA	ST	ST	ST	DA	CC	ST	DA	DA	ST	ST	ST	DA	CC	ST
3	PR	DA	CI	DA	PR	ST	CC	CC	PR	DA	DA	DA	ST	DA	
4	ST	PR	DA	CI	ST	DA	DA	ST	CI					CC	
5	CI	CI			CC	CI		CC	ST					ST	
6	DA														

Legend: CC = Card Catalog; CI = Current-Issues Section; DA = Desk Attendant; PR = Computer Printout; SeT = Self-Guided Tour; ST = Stacks



Map not drawn to scale

FIGURE 1. INDIANA UNIVERSITY GEOLOGY LIBRARY

desk attendant for locations of remaining items. He was familiar with the bindery, carrels, and in-process procedures and easily interpreted the information he received.

Fred's search strategy proved to be the most efficient and effective for this particular library and for the particular assignment he was given. On his tour, he found the current-issues section, which was missed by most students. The computer printout was easier to use for locating call numbers for serials than the card catalog, and because it included information on uncataloged serials—and Fred had a citation for one uncataloged item—it contributed to his success. No doubt his knowledgeable way of asking for assistance was also a major success factor.

In analyzing the search strategies used by the other fourteen students, it is important to remember that each needed to use the card catalog or computer printout for call numbers, the stacks, the current-issues section, and the desk attendant. Nine students (60 percent) were given one citation to an uncataloged item, the search for which required using the computer printout to obtain locations. Table 1 indicates that six of the seven successful participants (86 percent) used the card catalog and/or computer printout, stacks, current-issues section, and desk attendant, though the order in which these were used varied. Of the unsuccessful participants, only one (13 percent) used both the current-issues section and the computer printout. Often, however, desk attendants did not point out either of these; also, many students did not return to the desk after trying—and failing—to locate items in the stacks and current-issues section. Some ran out of time, and others incorrectly assumed that the library did not own the items they were seeking. In many respects, the participants' search patterns approximated the pattern anticipated by the geology librarian, but there were notable exceptions.

Discussion

As stated above, the main focus of this article is the presentation of a methodology that the investigators believe many libraries can use profitably. Though the number of participants was relatively small and participants were not chosen randomly, a number of interesting findings still warrant discussion.

The investigators were struck by the number of participants who articulated an implicit faith in the card catalog as a guide to all materials in the library and were unaware that a number of important categories of materials (uncataloged titles, current periodical issues, etc.) were not reflected there. Also, many did not know how to interpret the information given about bound serial volumes.

While the computer printout available from the Main Library's Serials Department was not designed to be a public service tool, the Geology Library—in common with many of the other branch libraries—clearly felt it filled a need and made it available to patrons. The staff increased its usefulness by adding call numbers. But while prominently displayed, the printout does not bear a label, nor does a sign point to its location, so that unless their attention is specifically called to it, patrons are unlikely to discover its existence and usefulness.

These first two observations relate to the fact that the ease of using a file system depends not only on the accuracy and user-friendly orientation of the individual components per se, but also on how easily patrons come to understand which file they must consult for any given type of information they want—in other words, they need a basic understanding of the file system as a whole to be able to use it effectively. What any given file does not contain is at times as important to define as are its contents. Few files are so self-explanatory and their contents so standard across libraries that students unsophisticated in library use can be expected to be able to utilize more than a single system. This factor is also closely related to the physical layout of the library. For example, if related files are adjacent, their use is facilitated.

The quality of assistance provided by the circulation desk attendants became an important factor in the search for serial literature because the librarian assigns them

a major role in patrons' searches that includes consulting certain files to which patrons do not have direct access. The quality of this assistance was uneven. Perhaps this is to be expected in most university departmental libraries that rely heavily on part-time student assistants. However, Carolyn Snyder and Stella Bentley argue that the "key public service role of student employees requires that they be trained and prepared for such work."[22] Assistants could be instructed to ask probing questions and to encourage patrons to return to the desk if they do not find what they are seeking. This study's methodology allows for detailed evaluation of the public service given by the desk assistants, and such an evaluation seems important.

As noted above, many participants had considerable difficulty with current-issue materials: students in both groups were uncertain about the age of serials in the current-issues section. This problem also surfaced in Murfin's survey; she reported that 40 percent of users failed to understand what was meant by "current" and "back" issues.[23] The extent of this particular problem suggests that a library needs to consider extraordinary measures for alerting patrons to the existence and arrangement of current issues in their particular setting.

In designing signage systems in general, librarians should be sensitive to how confusing the layout of a library can be for new users. Signage systems often overlook the obvious. Perhaps self-guided tours could also be used to improve patron awareness.

Conclusions

The methodology for evaluating the public service functions of serial file systems discussed in this study can be summarized as:

1. developing a description of the components, contents, and layout of the serial file system under study;
2. interviewing the library's administrator to obtain his or her analysis of how patrons locate serials in the library;
3. conducting a user survey employing potential (not habitual) patrons, carefully selected serial citations, a pretest, and unobtrusive measures;
4. analyzing data from the user survey in terms of successful and unsuccessful patron and system variables;
5. identifying specific aspects of the serial file system that relate to patron success and failure and formulating suggestions for modifying the system to increase the potential for higher success rates.

An important strength of the suggested method is that it includes a number of controls to ensure that the data collected are trustworthy and support sound conclusions. Examples of this approach are careful consideration of many factors in constructing the citation packet and the verification of cited items immediately before participants conduct their searches. Also, the process involves the evaluation of a system independent of its current use, an approach that takes into account needs that present users may not express as well as individuals who are currently nonusers, possibly because the system does not serve them well. Ideally, this methodology should be supplemented by studies of present users doing actual searches.

An additional use of this methodology can be postulated in the area of bibliographic instruction. Though the students in the study were at times frustrated, all said they had enjoyed the search experience and had learned valuable information about the library and searching. They were eager to discuss their failures as well as their successes and responded well to questions relating to past experiences with searching for information. Advantages of the methodology are that if the citations are carefully chosen, a small number of searches can introduce the student to a large number of potential problems in using the library and that the student receives immediate feedback on how to solve those problems.

This study's findings suggest that in bibliographic instruction, librarians should never underestimate a patron's ignorance of how to use libraries. Specifically, librarians could:

1. strongly encourage patrons to ask for assistance and supply all the information they have;

2. stress the limitations of the card catalog;
3. emphasize the need to look up journal titles, not article titles and authors;
4. define current versus back issues.

It is hoped that this discussion of the need to evaluate serial file systems and the presentation of a useful methodology will facilitate further work in this important area of library operations. Serial literature remains one of the most important forms of publication but, at the same time, one of the most difficult to control and make available. The careful review of a library's serial file system in light of how patrons locate needed materials can make a large contribution to that institution's efforts to provide effective public service.

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Cataloging U.S. Depository Materials: A Reevaluation

Alice Harrison Bahr

Automation is reshaping the rhetoric and content of an old debate: to catalog or not to catalog federal publications. The availability of quality records online, keyword search capabilities of online catalogs, and other developments argue persuasively against patent acceptance of old premises. This article reviews previous arguments, discusses conditions redefining them, and proposes partial guidelines for reevaluating current U.S. depository cataloging policies and practices.

ataloging United States government depository materials is an old debate. Beginning in the 1930s and continuing into the 40s, it was sparked by an increase in the number of depository materials. From 400 in 1900, for example, the number rose to 4,300 by 1930.[1] Typically, numbers dictated organization. Libraries that selected small numbers cataloged them, a practice endorsed for the smaller library by Mary Hartwell, cataloger for the Office of the Superintendent of Documents.[2] Those that received larger numbers maintained separate collections arranged alphabetically by agency, by type of material, or by Superintendent of Documents (SuDocs) classification number, thus organizing materials by agency and series rather than by subject.[3] The latter system was particularly easy, since materials were sent to depository libraries with shipping lists supplying SuDocs numbers. Other libraries used both approaches. They cataloged some materials and placed others in separate collections.

In time, arguments for the two basic arrangements became set. As Waldo points out, their bases "were merely unsupported opinions and assumptions."[4] Separatists pointed to the shortcomings of the card catalog: its inability to index serial publications, its paucity of subject headings, and its difficulty of use, especially for the user confronting the unwieldy U.S. author drawer. There were shortcomings with cataloging itself. It was not suitable for all materials, particularly pamphlets and posters. It imposed a classification system, either Dewey or Library of Congress, that precluded arrangement by agency, useful to some researchers. It increased delays between receipt and availability of materials. It was expensive. Quality records were sparse, necessitating original cataloging, and frequent title and agency name changes required multiple record handling. Relying on higher-quality indexes, with better quality indexing, provided better access to materials and information. Promoting staff familiarity with government materials, separate collections improved the quality of reference service.

On the other side, advocates of cataloging acknowledged its expense, but justified cost on the basis of improved, simplified access. Cataloging spared users the aggravation of consulting several indexes and the annoyance of learning a second classification system. It also provided immediate feedback on library holdings. In

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short, it was expensive and time-consuming, but resulted in better service.

The old arguments are changing. Technology is bypassing them and raising new questions. The availability of Government Printing Office (GPO) cataloging on networks, record retrieval on some networks by SuDocs number, and online catalogs and their related use studies both beg the assumptions of the past and highlight new needs. Among these are the need to keep abreast of technological developments, to reevaluate present policy in light of those developments, and to formulate policies based on both demonstrated user needs and technological developments.

TECHNOLOGICAL CONSIDERATIONS

Technology is reshaping old arguments by creating access other than through the card catalog, by streamlining cataloging procedures, and by creating a new form of the card catalog. Bypassing traditional card catalog access altogether, for example, Bruce Morton made use of available software and Carleton College's DEC VAX-11 to produce a SuDocs shelflist accessible not only by SuDocs number but by title, keyword, and Boolean operatives.[5] This is an exception, however; most libraries have relied on online vendors, national agencies, and bibliographic utilities to create new options.

The basis for most new possibilities is cooperation among the Government Printing Office (GPO), Library of Congress and Online Computer Library Center (OCLC). Deciding to speed up production of its *Monthly Catalog*, the official catalog of U.S. government congressional and departmental publications, GPO began cataloging on the OCLC shared cataloging network in 1976. To do so, it had to abandon its local thesaurus and conform to Anglo-American cataloging rules and Library of Congress subject headings.[6] Conformance ushered in GPO's new role as cataloging authority for U.S. government materials, which became official on January 2, 1981. GPO's use of OCLC produced the major benefit to libraries: availability of a substantial number of timely, high-quality records.

The type of records available has expanded, and reported hit rates are excellent. In October 1981 GPO assumed cataloging responsibility for materials distributed by the National Audiovisual Center.[7] In 1982 the University of Washington reported finding 75 percent of materials on OCLC. Its hit rate for U.S. government materials was 95 percent.[8] A 1985 Muhlenberg College study reported a 96 percent hit rate for selected categories of U.S. materials (see table 1).

Backlog at GPO is not significant. As soon as GPO catalogs materials, records are available on OCLC. In 1984 a one-month study of "priority one" cataloging items (congressional materials) indicated that 72 percent were input in 15 days and average input time was 24.4 days.[9] The SUNY/Potsdam Library (State University College at Potsdam, New York), which catalogs U.S. materials on OCLC, begins searching one to two months after receipt of documents.[10]

Cooperation between GPO and bibliographic utilities has increased the number of quality records available to libraries relatively soon after publication. It has also created new means of access to those records and new cataloging services. In 1980, OCLC surveyed libraries to determine their interest in an even quicker cataloging process, DARP (automatic distribution of cataloging). Targeted initially for regional depositories (those libraries receiving all available depository materials), the service would have created individual catalog records for libraries receiving depository series. Cataloging would have been automatic, completed as soon as GPO cataloged an item in a series but due to the cost of the service, DARP never got off the ground.

There is a difference between having records available and having quick, convenient access to them. For cataloging purposes, access by SuDocs number is desirable. It allows catalogers to work directly from shipping lists to search for records. OCLC made SuDocs number access (OCLC's gn: government number key) available in 1980. In 1985 it became possible to search for records by any SuDocs number attached to a title, as of the point of cataloging. SuDocs numbers change when an issuing agency changes, which

TABLE 1

OCLC Record Availability

Shipping List Dates	Cataloging Candidates (#)	Available Series Cataloging (#)	Hearings	Geological Survey Professional Papers (#)	Geological Survey Bulletins (#)	Non-GPO Record (#)	No OCLC Record (#)	OCLC Record Availability (%)
P840601-1 to P840831-5#*	97	4	27	12	6	15 (14/DLC)†	4	96%
M840601-1 to P840831-8‡	12		10			12		100%
Total	109	4	37	12	6	27 (15/DLC)	4	96%
P840904-1 to P841123-4	66	5	15	6	8	10 (7/DLC)	3	95%
M840904-1 to M841129-5#	14		9			8 (1/DLC)		100%
Total	80	5	24	6	8	18 (8/DLC)	3	95%
Combined Total	189	9	61	18	14	45 (23/DLC)	7	96%

*P = paper shipping lists.
†DLC = the number of non-GPO records that are Library of Congress records.
‡M = microfiche shipping lists.

means one title may have several SuDocs numbers. Both searching capabilities enhance access to records.

Another benefit of GPO's use of OCLC is the generation of machine-readable records on tape. Used to produce *Monthly Catalog*, the tapes have other uses. They are loaded regularly onto other shared cataloging networks like the Research Libraries Information Network (RLIN) and Western Library Network (WLN) to provide users of those systems with access to the same GPO records as OCLC users. Availability is not as immediate as in OCLC, since GPO tapes are loaded monthly, and these networks do not yet provide SuDocs number access.[11]

Tapes have another potential use for libraries using or planning to implement an online catalog. They provide an alternative means of including GPO records in a local online catalog. One possibility is to download records from a shared cataloging network by means of an interface. The other is to load GPO tapes into the online catalog. This requires tape manipulation both to load the tapes and to eliminate records neither received nor cataloged, i.e. maps, serials, etc.

Cooperation between national agencies and shared cataloging networks weakens the argument that quality records are unavailable, a main pillar in the argument against cataloging U.S. materials. Similarly, the existence of the online catalog erodes another premise, that excessive record handling contributes to the high cost of cataloging. In manual catalogs, record changes require pulling, editing, and refiling cards, usually seven to a set. An online catalog eliminates these steps. While this is a benefit regardless of what materials are being cataloged, it is a particularly strong one for depository materials, which undergo frequent main entry and title changes.

Those frequent changes are inherent in the nature of both serials and government organizations. While little can be done to eliminate the former, technology can help simplify the latter. Some online catalogs incorporate authority control for personal authors, and a few offer it for corporate authors and series. If the catalog also offers online global change, one change to an authority record will automatically alter in the same way all affected headings throughout the database.

A common argument against cataloging U.S. materials is the paucity and inade-

quacy of subject headings. Online catalogs have the capacity to increase the traditional author, title, and subject heading access points. To search the manual catalog successfully, users must know precise authors and titles, guess the correct subject term, or know how to use *LC Subject Headings* volumes. Most online catalogs are more forgiving. They provide keyword access to some or all fields as well as SuDocs number access. The latter is increasingly useful as more and more sources include these numbers. Public Affairs Information Service announced recently that 65 percent of indexed U.S. government materials include SuDocs numbers.

By simplifying record changes, eliminating filing, and increasing access points, online catalogs can facilitate a variation of the old either/or proposition to catalog U.S. materials or to house them separately. These catalogs make it easy to combine approaches, namely, to catalog materials, classify them by SuDocs, and yet keep them separate. The same arrangement is possible in a manual catalog, but filing alone argues against it. The library at SUNY/Potsdam, which has cataloged on OCLC and classified by SuDocs since the 70s, reduces filing by cataloging selectively.

Technology, of course, is not a panacea. An automated SuDocs shelflist has the advantage of creating more access points than a traditional card catalog, but it also forces users to consult more than one catalog to locate information.

The availability of records on shared cataloging networks has been an important technological advance. However, not every library uses one, and not every network offers SuDocs access. For libraries using networks, whether or not SuDocs access is available, there are other possible constraints. GPO is slow to catalog certain materials.[12] Possible downscaling of cataloging might also present problems. There has been no report about GPO's 1982 discussions on the possibility of downscaling AACR2 cataloging to augmented level II and no longer providing corporate and personal name authority work.[13]

Specific GPO practices may be of greater concern. For example, GPO provides no collective series entries for titles in monographic series, only individual analytics. This means, for example, that if a library staff decide that a few subject headings will suffice to lead users to the content of U.S. Geological Survey Professional Papers series, they must, if using GPO copy, provide individual analytics for titles in those series. The Depository Library Council, an advisory body comprised of librarians, has repeatedly passed resolutions requesting series cataloging, but official GPO response has been that current practice conforms to depository law. This problem is not insurmountable, however; it requires only that a library create a few collective series entries.

Technological changes are catalysts. They provide new possibilities and challenges, not perfect answers—microfiche records provide an example. GPO catalogs only paper copies of publications that are converted to microfiche for depository distribution. A note indicates that distribution to some depositories was on microfiche, and the word *microfiche* appears after the item number. However, libraries with substantial fiche collections might not welcome the editing required. Exchanges between the Depository Library Council and GPO have thus far produced only the following resolution: GPO's policy is in accord with Title 44 of the *U.S. Code*, and librarians are free to modify records.[14] Actually, a number of libraries do so, creating suitable records in most cases. This is especially true for government hearings.

Shipping lists from GPO are not always correct, creating another cause for concern depending on the delay between receipt of lists and actual cataloging. Revisions to shipping lists, called "corrections lists," are issued periodically to clear up incorrect SuDocs numbers, typographical errors, and wrong item numbers (the numbers used to order depository series).

GPO tape users face greater problems. For example, tapes include all GPO cataloging, and unless a library has received all these materials (some of which are nondepository, that is, not offered to depository libraries), records must be eliminated either in-house or by a vendor. Regardless of who processes the tapes, records are

usually extracted by item number. Since it is not uncommon for depository libraries to fail to receive some items ordered, records may be created for titles not in fact held. The result is like cataloging on the basis of what is ordered instead of what is received. In addition, tape loading on an online system requires manipulation of data.

Not every library has, or plans to have, an online catalog. Even for those who do, GPO tapes present additional difficulties: they come without documentation. Control numbers like OCLC, SuDocs, technical reports, and contract numbers are either omitted or appear in incorrect fields.[15] Correction tapes are not issued. Consequently, errors must first be detected and then corrected manually. There are multiple records for errata slips and periodical issues, and not all series, subjects, and names conform to LC form.

Fortunately, many of the GPO tape errors and limitations have been corrected. The Depository Library Council has been requesting since spring 1979 that GPO convert traced names, series, and subjects to LC form; add control numbers such as item, SuDocs, and stock numbers (used for direct purchase of materials) to appropriate fields; and correct typographical and other errors.[16] The Public Printer announced at the fall 1984 Council meeting that the project would be undertaken and supervised by Judy Myers at the University of Houston.[17] Funds were never allocated. One year later Brodart announced its GPO file, which includes LC subject and name headings and control number corrections. Correction pages from annual *Monthly Catalog* volumes are being keyed in. While Brodart is still investigating procedures to handle separate serial records, its GPO file offers dramatic evidence of how quickly technology changes situations.

COST CONSIDERATIONS

The availability of quality records in various forms, a major obstacle to cataloging, is part of a larger consideration: cost. Even if quality records are available, are they affordable? The assumption has been no, despite the absence of comparative cost data for processing, maintaining, and supervising separate collections. Fortunately, new possibilities have been explored with an eye to reducing expenses. Available cost data highlight the weakness of previous assumptions and also undercut them.

The cost of Carleton College's automated SuDocs shelflist was determined by counting the bytes per record and then calculating the required disk space for a given number of records. At 310 bytes per record, the storage cost for 431,600 records was $8,500, the same price as a 260,000-block disk and drive.[18] Disregarding input time and use and storage costs, all of which were absorbed by the Computer Center, the unit cost for the shelflist was $1.98, slightly higher than OCLC first-time use charges.[19]

In 1984 Bowerman and Cady, suspecting libraries might include records in their online catalogs if they were available at "a small fraction of the cost incurred in a traditional cataloging environment,"[20] compared costs for various methods of obtaining records. The researchers took a sample from a GPO test tape to develop a cost-effectiveness model on which to base a comparison of four ways of obtaining machine-readable records. Two of the four ways involved tapes: the first manipulated in-house, the second by Marcive, a commercial firm that strips records from tapes for libraries. The other two options involved automated cataloging services, either online through OCLC's network or offline, inputting records on a microcomputer and sending them to Library Systems Services, Inc. (LSSI) for tape or card production.

The results were as follows: a library cataloging approximately twelve thousand publications (about 35 percent of available items exclusive of maps, serials, and microfiche) would spend about $1,500, $1,800, $17,000, and $2,600 to obtain records from GPO, Marcive, OCLC, and LSSI, respectively.[21] Record extraction by Brodart, unavailable at that time, reduces costs further: $600 for twelve thousand records ($.05 per record), excluding tape and profiling charges.

While the study notes the need for data processing personnel for in-house manipulation and raises appropriate questions

about quality control in Marcive and LSSI processing, it confines costs to the acquisition, not the storage, of records.[22] Regardless, it dispels the the idea that under any and all circumstances cataloging U.S. materials is prohibitively expensive.

USER CONSIDERATIONS

Under some circumstances, then, cataloging of GPO materials is affordable. But is it desirable from the users' perspective? Early studies indicate catalogs are under used and misused. Recent studies reveal little enthusiasm for the enhanced search capabilities of online catalogs. One use study indicates certain faculty locate government publications outside of the library. All studies indicate that much more needs to be known about the use of libraries, government materials, and catalogs before a decision is made about cataloging U.S. depository materials.

According to previous surveys, only 59 percent of library patrons use the catalog.[23] Most catalog users look up one entry and stop.[24] They locate correct subject headings only 50 percent of the time.[25] In 1958 ALA surveyed 5,494 catalog users in thirty-nine libraries. Results showed a failure rate of 20 percent for known-item searches and 13 percent for subject searches.[26]

The capabilities of the online catalog are not as important to user satisfaction as suspected. The Council on Library Resources (CLR) supported a 1982 study of twelve thousand online catalog users in twenty-nine libraries. Eighty-five percent reported finding some or all of what they were searching for, and subject searching was of greater interest than the ALA study concluded.[27] Online catalog capabilities such as keyword access and search qualifiers by date, language, and Boolean operatives, however, were not perceived universally as benefits. The CLR study found that language and call-number search limits had a slightly negative effect on satisfaction and that keyword and Boolean operatives were unrelated to satisfaction.[28]

Some users bypass the catalog altogether. In his 1984 study of government publications use, Peter Hernon indicated that "academic social scientists rely upon their subject literature and interpersonal sources (e.g., colleagues) for awareness of source material. They do not make extensive use of indexing and abstracting services and bibliographies housed in libraries."[29] Frequently, they obtain materials from outside the library.

Rather than making definitive statements, these studies point out how little is known and how much remains to be seen. After examining two hundred catalog use studies in the most extensive book on the subject, *Redesign of Catalogs and Indexes for Improved Subject Access*, author Pauline A. Cochrane concludes, "we come away from catalog use studies quite discouraged about the present state of use of our catalogs, with no sure guidance about improvements and the impact of changes."[30]

No evidence supports the assumption that cataloging is always desirable. No substantive evidence supports the opposite view. Technological changes make that clear. They encourage investigation of present situations, their corresponding possibilities, their costs, and their effectiveness in meeting user needs *independent of old assumptions*. For single answers, they substitute questions.

PARTIAL GUIDELINES FOR REEVALUATING CATALOGING POLICIES

The old question of whether or not to catalog U.S. depository materials raises no single query. It was made into one by technologies that limited options, elevated and fixed cost considerations, and made assumptions about user needs. Newer technologies suggest several questions: they focus on current and future levels of automation, available technologies, and the need to know more about collections and their use.

1. Does the library catalog on a shared cataloging network? If so, what access does the network provide to GPO records?

2. Does the library have or plan to implement an online catalog? Will it permit keyword, SuDocs number searching? Does it include authority control and global change capability?

3. How does the library's clientele learn

of government publications (e.g., through journal articles, colleagues, indexes, GPO sales brochures, news broadcasts, etc.)?

4. How does the library's clientele look for and obtain government publications? Do patrons look in the library?

5. What are the major strengths of the government publications collection (e.g., congressional materials, geological materials)?

6. Is there a clientele for those collection strengths?

7. Is cataloging the best means of addressing the needs of that clientele?

8. Is manpower available to define the means and related costs of cataloging?

9. Will cataloging be selective? If so, what categories or types of materials will be excluded?

No single library can address all these questions, but, for some, GPO shipping lists may provide one option for testing assumptions, exploring possibilities, and determining costs.

What can shipping lists do to answer these questions? For RLIN and WLN users, they can test the speed with which records can be searched without SuDocs access. For all shared cataloging network users, they can help determine network costs for cataloging U.S. materials. (See table 2.) They can help identify the type of entries available for specific depository series (analytics or series), their timeliness, and their sources. The 040 field contains the cataloging agency. If *GPO* appears first, it was the first cataloging agent. If it appears elsewhere, GPO modified an existing record. If the Library of Congress has modified a GPO record, *DGPO/GLC* will be found in this field. Finally, for both network and nonnetwork users, shipping lists can assist in identifying collection strengths, providing crucial direction for determining what will be cataloged, and forming policy that reflects those decisions.

Realizing that the card catalog may not be the single most appropriate vehicle for locating government materials, that not all materials (e.g., posters, pamphlets) merit cataloging, and that cataloging all materials increases cataloging costs, a number of libraries have either established or recommended policies for cataloging select categories of U.S. materials. Peter Graham recommendeds that large research libraries concentrate cataloging efforts on collections that are not indexed.[32] At the University of Houston, priority is given to "publications of agencies that the average user does not know are government agencies."[33]

Whether policies are set or explored, careful arranging and coding of shipping lists can verify the feasibility and costs of policies. Shipping lists must be representative of type and extent of receipts. Monthly statistics can establish the latter. Then lists can be separated into microfiche and paper piles to examine each format separately and into chronological piles to test the timeliness of available records. Coding should reflect specific interests. For instance, items received on deposit can be checked, those considered for cataloging circled, and candidates for series cataloging marked with an *S*. Special types of materials that could dramatically increase cost if cataloged may be studied separately (e.g., hearings might be preceded by an *H*), and cataloging agent can be indicated as *GPO, LC,* or *Other.*

Such an examination begins to provide a picture of what a library can afford to catalog on the basis of type of catalog records

TABLE 2

OCLC Cataloging Costs

Estmated Number of Cataloged Titles (annual)	Unit OCLC FTU Cost (dollars)	Extended OCLC FTU Cost (dollars)	Unit OCLC Card Cost (dollars)	Extended OCLC Card Costs (dollars—7 cards per title)	Extended OCLC FTU and Card Costs (dollars)
400	1.47	588.00	.0495	138.60	726.60

Notes: An online catalog would eliminate the need for cards and reduce costs to $588. No reliable estimate of staff costs exists. With minor record changes, most titles could be processed in five minutes or less. At $10 an hour, 300 hours of professional cataloging time would cost $3,000.

rather than on number of titles; whether records are available; whether they are timely; whether sufficient numbers of records are available for microfiche; and, consequently, whether or not fiche should be included in cataloging programs. For most libraries, whether or not they are able to determine these considerations by searching items on a shared cataloging network, shipping lists may suggest criteria for including or excluding certain types of materials from cataloging. In short, they can be used to qualify general assumptions about the feasibility and affordability of cataloging U.S. materials in a specific environment.

SUMMARY

Arguments against cataloging U.S. materials have assumed that cataloging was difficult in the absence of available records, time-consuming because of numerous title and agency name changes, and expensive as a result. Other negative reasons have been that cataloging limits shelf arrangements to Dewey or LC and causes delays between receipt and availability of materials to patrons. On the positive side, despite inadequate and difficult entries, cataloging the materials provides the most convenient, direct, and useful means of access.

In an automated cataloging environment, all of these assumptions can be disproved. Shared-cataloging network users have online access to records; online catalogs minimize the record-editing process and facilitate the simultaneous, separate SuDocs shelf arrangement and cataloging of materials, thus eliminating the usual delays associated with cataloging: the availability of tape records, vendors who can manipulate tapes, and selective cataloging reduce traditional expenses. Finally, studies have shown that the card catalog is not as pivotal to all users' needs as was once thought.

The new cataloging environment mandates a new look at an old debate, encouraging exploration of alternatives and dismissal of some earlier assumptions. Most important, the online alternatives highlight the central importance of knowing more about the need for, use of, and methods of obtaining government information.

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Community College Learning Resources Centers at the Crossroads: Illinois, a Case Study

Eileen Dubin and Linda Bigelow

In 1985 a survey of public Illinois community college learning resources centers was conducted. The study revealed a great variety in the organization, staffing, collections, and services provided by LRCs. The LRCs have entered resource sharing in a variety of ways and have experienced a large growth in interlibrary loan transactions and the use of telecourses. The survey revealed, however, that 64 percent have book collections of less than 50,000 volumes and that twenty of the forty-two have periodical collections that are below ACRL standards for community colleges. Also, LRC progress in developing automation for housekeeping and resource sharing has been piecemeal and lags behind the introduction of automation in other library sectors in Illinois.

Community colleges, like other institutions of higher education, recently have been buffeted by rapid technological change and severe social pressures, including changes in enrollment patterns. More generally they are in the midst of a transformation that may impact their missions, goals, and organizational structures. They are in need of leadership that can anticipate economic, social, demographic, and technological change and bring together the skills, flexibility, and persistence for meeting changing educational requirements.[1] At the same time they are still experiencing the effects of the high inflation so prominent in the early 1980s and a shift in public priorities that has, in real terms, reduced federal funds and, in many cases, state appropriations. Accordingly, community college learning resource centers (LRCs) are also struggling to adapt to these changing needs under conditions of financial constraint.

As a result of technological changes, LRCs are transforming their roles as collection centers into centers for accessing information.[2] They are being linked into communication networks that allow them to reach beyond their own walls to identify and retrieve information stored in a variety of ways in a variety of institutions. The challenges implied by these tasks reach into all corners of the library profession as it currently exists. Every function of the library has been touched, and the tasks of every professional have been and will continue to be transformed. Apart

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from these intellectual resources, substantial capital investment will be needed to bring the new technologies into operation, to retrain professionals who are required to provide traditional services in new ways, and to acquire the means of offering new services.

LRCs are faced with these challenges while continuing to support the academic and community missions of their colleges. Currently these institutions provide a broad range of educational programs and services. In Illinois, as in California, New York, Florida, Texas, Maryland, and North Carolina, each public community college has a comprehensive mission.[3] Each has a liberal arts and sciences program to prepare students who wish to transfer to four-year colleges and universities or pursue lifelong learning; vocational and technical programs for job training, retraining, or upgrading of skills; and preparatory, developmental, and remedial programs to furnish students with secondary school certification, upgraded skills, or help necessary for success in postsecondary education. With the increase in nontraditional learners, there has also been a substantial rise in developmental education courses and a quiet revolution in instructional methodology. This methodology includes computer-assisted instruction and other forms of delivery to enhance literacy and learning. In addition, all public community colleges are committed to public service programs through adult continuing education.[4]

Late in 1984 the Illinois Association of College and Research Libraries/Illinois Board of Higher Education Ad Hoc Committee on Community Colleges conducted a survey to determine the current condition and foreseeable needs of Illinois public community college LRCs. The survey queried the LRCs about their programs and resources; their hours of service; the size and professional status of their staffs; the nature, size, and use of their collections; their unique collections; the kinds of services they provide; the use of automation and telecommunications; and the kinds of resource-sharing networks in which they participate. In particular, the survey was designed to help identify ways in which community college LRCs might strengthen resource sharing.

Survey forms were distributed to fifty LRCs. Forty-two were returned for a response rate of 84%. Additional community college demographic data were obtained from the *Data Book on Illinois Higher Education 1984 and 1985* and from the Illinois Community College Board (ICCB) (see table 1).

Enrollment data in table 1 show that over the last decade almost 50 percent of students enrolled in higher education in Illinois have been on community college

TABLE 1

ENROLLMENT AND FINANCIAL DATA FOR ILLINOIS COMMUNITY COLLEGES
1976–85

*Year	Total Enrollment	% of College Population in Illinois CC	†Operating Expenditures	‡LRC Support	% of Total Educational Budget
1976	326,058	48.9	232,498,276	11,223,134	4.8
1977	329,947	49.2	257,938,640	11,601,900	4.5
1978	322,367	48.7	279,463,060	11,903,467	4.3
1979	323,652	48.7	292,853,498	12,691,751	4.3
1980	359,047	50.3	328,425,957	14,223,430	4.3
1981	388,369	52.0	374,893,852	16,146,584	4.3
1982	387,822	52.1	427,776,579	17,677,994	4.1
1983	356,643	50.1	450,794,856	18,399,122	4.1
1984	361,187	50.5	478,834,148	19,410,203	4.1
1985	339,782	48.7	486,170,303	19,919,438	4.1

*Illinois Board of Higher Education, "Enrollment Trend Data," *Data Book on Illinois Higher Education*, 1985, p.83.

†Illinois Community College Board, "Data and Characteristics of the Illinois Public Community College System 1976–1985," various editions, plus information through phone conversation with ICCB staff.

‡Illinois Board of Higher Education, "Audited Expenditures for Illinois Public Community Colleges by Functional Classification," *Data Book on Illinois Higher Education*, 1984 and 1985, p.248 and 236.

campuses.

Funding for the LRCs in Illinois declined from 4.8 percent of operational budgets in 1976 to 4.1 percent in 1985. Overall operating appropriations increased almost 18 percent more than LRC appropriations.

Indeed, while LRC appropriations increased between FY76 and FY85 from $11,223,134 to $19,919,438, or by 17.75 percent, they lagged substantially behind the rate of inflation.[5]

MISSION AND SCOPE

While responses to the survey question on mission and scope varied greatly in length and detail, all the institutions described their missions in terms of providing "services and material resources required to meet the informational, learning and development needs" of their students, faculty, administrators, and district residents. They also identified themselves by reference to a multiplicity of services offered. These include collection development, bibliographic instruction, reference, audiovisual services, production of video materials, maintenance of cable TV operations, film rentals, production of graphics and photographs, support of telecourses, microcomputer labs, and aid to handicapped students and those needing remedial assistance. Few of them indicated how changing technologies fit in with their missions or reported on possible partnerships for instructional purposes.

HOURS OF SERVICE

LRC hours of service averaged 66 per week, with a range of 42.5 to 82.75. Just over half of the LRCs provided some Saturday hours, while only seven were open on Sunday, reflecting the nonresidential nature of community college student bodies.

STAFF

While most of the LRCs have full-time administrators, in some the administrator also serves as librarian.

Respondents were asked to report only those members of their staffs engaged in library and audiovisual activities. The number ranged from a low of 2 to a high of 43.5. Nine LRCs reported no administrators, 6 no professional librarians, and 9 no

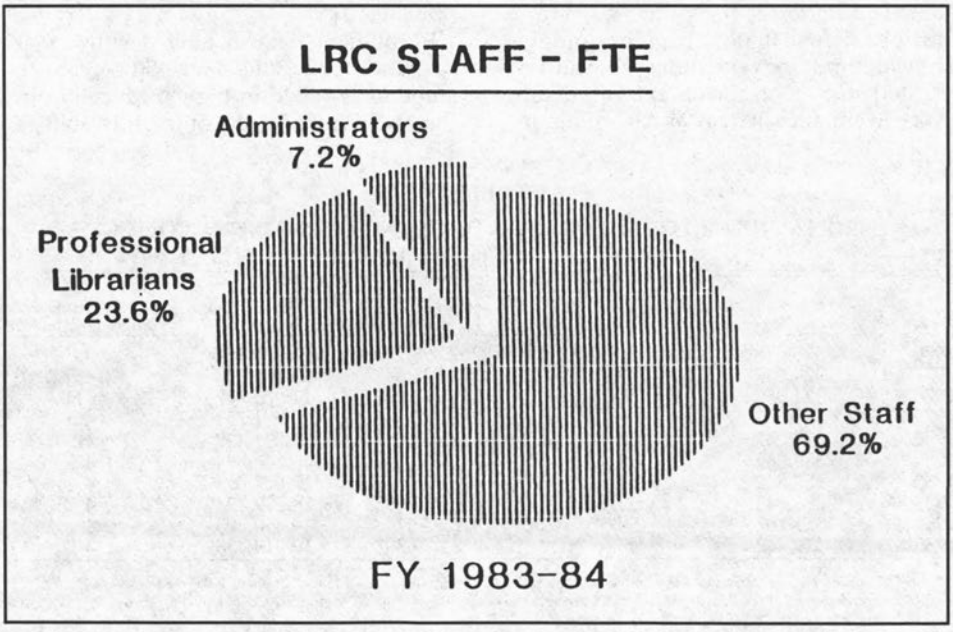

FIGURE 1

classified/technical staff members. Overall staffing increased 3 percent from FY81 to FY84, with most of the increase in the classified staff (variously referred to as classified, clerical, and paraprofessional). Figure 1 shows the current percentage of LRC staffs in each of the three categories.

COLLECTIONS

The collections of the responding LRCs totaled 2,635,577 items, of which 673,852 were nonprint and 1,961,725 were print materials. Book collections ranged from a low of 5,400 to a high of 115,063 volumes, although twenty-seven of the forty-two LRCs (or 64 percent) had under 50,000 volumes. The number of volumes increased 15 percent from FY81 to FY84 (see table 2).

Periodical collections ranged from a low of 79 to a high of 790 titles (see table 3). Periodical subscriptions for the thirty-six LRCs providing statistics decreased 6 percent from FY81 to FY84.

TABLE 2

BOOK COLLECTIONS BY SIZE: FY 1984

Number of Volumes	No. LRCs
29,000 or less	7
30,000- 39,999	12
40,000-49,999	8
50,000-59,999	4
60,000-69,999	4
70,000-79,999	2
80,000-89,999	1
90,000-99,999	1
100,000-116,000	2
NA	1
Total	42

Total volumes: 1,961,725

TABLE 3

PERIODICAL SUBSCRIPTIONS: FY 1984

Number of Subscriptions	No. LRCs
99 or less	2
100-199	2
200-299	12
300-399	7
400-499	4
500-599	7
600-699	2
700-799	4
NA	2
Total	42

One way to look at the LRC periodical collections is by reference to the 1979 ACRL quantitative standards for periodicals in community college LRCs. Taking into account FTE enrollments, ACRL identifies the number of subscriptions that qualify a collection as minimal or good.[6] Translating Illinois data into the ACRL format, one finds that twenty of the Illinois institutions have below-standard collections; seventeen, minimal collections; and only three, good collections (see table 4).

CIRCULATION

Forty LRCs circulated 1,402,096 books and media in FY84, an increase of 21 percent over FY81 for those LRCs providing comparative statistics.

INTERLIBRARY LOAN

Interlibrary loan transactions in LRCs more than doubled from FY81 to FY84. In FY81 LRCs lent 8,914 items, while in FY84 they lent 20,299 items. In FY81 LRCs borrowed 16,118 items, while in FY84 they borrowed 33,042 items. It is significant that all but one of the top ten lenders and top ten borrowers participated in a shared database such as Online Computer Library Center (OCLC), C L Systems, Inc. (CLSI), Library Computer Systems (LCS), or Data Phase.[7]

The dramatic increase in interlibrary loan activity shows a willingness on the part of community college LRCs to contribute to resource sharing. Most of them are currently net borrowers from institutions outside the LRC system, demonstrating their dependence upon external resources.

SERVICES

The LRCs provide a wide range of services: all provide reference services and LRC orientations/tours; all but one distribute audiovisual equipment. Other services most frequently cited included in-house production services, (graphics, transparencies, audio and video production, audio and video duplication, sound/slide production, lamination, photography, signs, posters, dry mounting, and printing); bibliographic instruction;

TABLE 4

ACRL QUANTITATIVE STANDARDS FOR
PERIODICALS SUBSCRIPTIONS AND
PERIODICAL COLLECTIONS OF ILLINOIS COMMUNITY COLLEGES

	Standards		Schools Reporting				
FTE Enrollments	Level	No. of Periodicals	No.	B	M	G	NA
UNDER 1,000	M	200	2	1	1	0	0
	G	300					
1,000–3,000	M	300	22	12	7	2	1
	G	500					
3,000–5,000	M	500	11	4	5	1	1
	G	700					
5,000–7,000	M	700	3	2	1	0	0
	G	800					
7,000–8,000*			1	0	1	0	0
8,000–9,000			0	0	0	0	0
9,000–10,000			1	1	0	0	0
11,000–12,000			2	0	2	0	0
			42	20	17	3	2

Legend:
B = Below Standard
M = Minimal
G = Good
NA = Not Available

*For enrollments over 7,000, the ACRL Standard minimal (M) is 5 periodicals per 1,000 FTE; good (G) is 30 per 1,000.

online database searching; typewriters for public use; services to the handicapped; microcomputer labs; telecourses; developmental courses; study skills centers; GED; English as a second language; testing centers; and copier service. The diversity of these services reflects the dynamic and changing environment in which the LRCs operate.

AUTOMATION

Twenty, or less than half, of the forty-two responding LRCs subscribed to the OCLC cataloging database. Many of these had not converted their holdings into machine-readable form and did not subscribe to such OCLC subsystems as acquisitions, interlibrary loan, and serials control. A number of LRCs used automated circulation systems, but they varied in kind and did not interface. Outside of cataloging and circulation, the other major impact of automation was in word processing.

TELECOMMUNICATIONS

Illinois public community colleges are just beginning to use various telecommunication options, including television broadcast capabilities of low-power transmitters, instructional television fixed services (ITFS),[8] and ultra-high frequency (UHF); radio broadcast capabilities of AM, FM, and subcarriers; land-line links and cable TV; and teleconferencing.

TELECOURSES

Community colleges have been particularly successful in offering telecourses. Twenty-six colleges offered from two to twenty telecourses each semester. Enrollment, as shown in Figure 2, climbed steadily from 1981 to 1984, resulting in an enrollment increase of 203 percent.

At least half of the Illinois community colleges offered telecourses. Videotapes of the telecourses are placed in the LRC and in various off-campus sites such as public libraries and extension centers. Telecourses may also be telecast over local cable stations or on public broadcast stations. In order to provide as much flexibility as possible, many of the colleges provide their students with both the nonbroadcast and broadcast options.

NETWORKING AFFILIATIONS

Public community college LRCs in Illinois have developed very active networks for cooperative activities through three regional consortia: the Northern Illinois Learning Resources Cooperative

(NILRC), the Mid-Illinois Learning Resources Cooperative (MILRC), and the Southern Illinois Learning Resources Cooperative (SILRC). The goals of the three "Rocks" are to strengthen the skills and knowledge of LRC personnel through in-service training and workshops; to improve the cost-effectiveness of member LRCs through such cooperative purchasing agreements as telecourse leasing/purchasing, film-to-tape transfers, off-air recording rights, and reference works; and to exchange information through meetings, publication of an Illinois Learning Resources Personnel Directory, and working committees such as the Telecommunication Advisory Group, Instructional Television Fixed Services/Satellite Distribution Committee, Illinois Community College Board Evaluation Committee, and Staff Development Committee. Apart from the City Colleges of Chicago, which do not participate, all but two Illinois public community college LRCs belong to one or more of the three "Rocks."

NILRC, MILRC, and SILRC come together under the umbrella organization of the Learning Resources Commission of the Illinois Council of Community College Administrators (ICCCA) and through this commission have expanded regional cooperative efforts and communication links into significant statewide activities.[9] NILRC recently approved the hiring of a full-time executive director, as the work of the cooperative has expanded beyond what members can accommodate on a volunteer basis. This action required a dues increase and caused some loss of member-

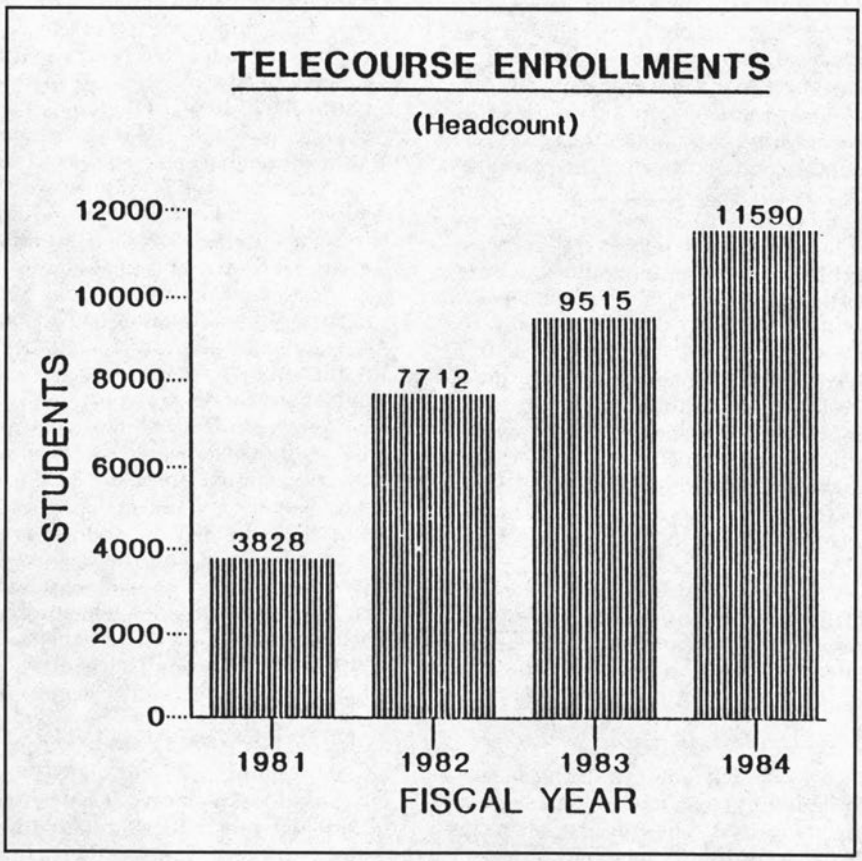

FIGURE 2

ship.

Community college LRCs have also formed strong links with their communities by actively participating in the regional public library systems of the Illinois State Library and Information Network (ILLINET). Through ILLINET some are sharing in automated databases, most are participating in interlibrary loan activities, and many are receiving the benefits of staff development workshops, aid for the blind and physically handicapped, film rentals, materials delivery systems, consulting services, cooperative purchasing, union lists, and back-up reference assistance.

The City Colleges of Chicago have formed their own system and share resources with each other on a formal as well as an informal basis. They also are affiliated with the Chicago Public Library System. Other consortia to which LRCs belong are based upon special interests or regional affiliations. These networking activities represent a dynamic that over time may lead to greater coordination and resource sharing throughout the state.

CURRENT STRENGTHS OF COLLECTIONS

LRC collections in Illinois reflect the diverse curricula of their institutions. Frequently cited collection strengths were in nursing and allied health, agriculture, women's studies, and criminal justice. Some subjects for which there are unique collections are nondestructive testing, clock and watch repair, legal technology, fashion design, orchestral music scores, and plastics and polymers.

PERCEIVED NEEDS IN RESOURCE SHARING

The survey asked LRC respondents to identify what they believed to be additional resource sharing needs. Their recommendations fell into six categories:

1. Develop an interconnected online catalog throughout the state by interfacing existing online systems.
2. Actively implement existing legislation for multitype regional library systems that will include all types of libraries within geographic regions.
3. Improve online union lists of print and nonprint materials, including reference collections, serials, special collections, media materials, computer software, and telecourses.
4. Devise less expensive communications systems.
5. Institute cooperative production of media materials, including telecourses.
6. Expand programs for cooperative purchasing.

A number of the institutions recognized that additional funding would be required to accomplish the purposes they described.

CONCLUSIONS

Public community college LRCs in Illinois have much in common. In recent years they have experienced a marked growth in circulation and interlibrary loan transactions and in the use of telecourses. They have engaged in resource sharing in a variety of ways and through a variety of organizations. However, progress in developing automation for housekeeping and resource sharing has been piecemeal and lags behind the introduction of automation to other library sectors in Illinois.

In a recent article on LRC automation, Barbara Dohrman and Jack Weiss of the Elgin (Illinois) Community College LRC, attribute LRC automation lag to budget constraints and the low value placed on automation by community colleges.[10] The limited automation and apparent disinterest threaten to leave Illinois community colleges in a backwater that ultimately may compromise their ability to fulfill their academic missions. Right now, for instance, the Illinois State Library is creating an online catalog that, when completed, will contain over three million titles. LRCs without adequate automation will be unable to tap into this system. They will be unable to employ network resources and services that will become increasingly important in the face of limited budgets, burgeoning knowledge, and changing student clients (and needs). They will, as a consequence, be ill-equipped to function in the academic mar-

ketplace. To remedy this situation at least three steps seem essential:

1. LRC directors must convince their college administrators to place greater priority than now exists on automating their LRCs and linking them into existing and potential networks.
2. LRCs must enter more fully into networks that keep them abreast of new technologies and trends in statewide activities.
3. LRCs, with Illinois Community College Board support, must develop specific proposals for resource sharing that attract the support of existing public and private funding agencies.

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3. In Illinois there are thirty-nine community college districts with fifty-two colleges. Thirty-seven of these colleges are governed by locally elected boards of trustees. In Chicago, the nine community colleges are governed by a locally appointed board of trustees, while State Community College in East St. Louis has a board of trustees appointed by the governor of Illinois. With the exception of East St. Louis, each district has local taxing power. The thirty-nine districts encompass 97 percent of the state's population. An effort to find data on community college LRCs in states having similar two-year institutions has been unsuccessful. Specific reports have been located for particular years, providing scattered data insufficient for comparative purposes.
4. In fact, in 1983, 378,393 students in Illinois were enrolled in these noncredit programs ("Enrollment Indicators Brief," *AACJC Letter Supplement*, May 1, 1984). In addition, Illinois community colleges enroll 55 percent of entering freshmen in all higher education [*AACJC Letter*, no.107:2 (Sept. 4, 1984)]. The age of community college students ranges widely. Well over 50 percent are twenty-five years or older, and 70 percent attend college on a part-time basis (Illinois Community College Board "General Information" brochure, Oct. 1985).
5. While totally comparable data are not readily available, the Illinois Board of Higher Education's "Higher Education Price Index for Books and Periodicals" shows that the cost of these materials nearly doubled between FY76 and FY84, while its adjustment for library materials price increases built into higher education appropriations amounted to less than half of the sum required to match inflation. ("Chancellor's Report #9," Aug. 1, 1985, p.39).
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Research Notes

Attitudes toward Technology as Predictors of Online Catalog Usage

Grant Noble and Steve O'Connor

While other studies have concentrated on evaluations of specific online public access catalog (OPAC) software, this study addresses the general acceptance of computer technology, as well as user attitudes toward OPACs. Questionnaire data was subjected to factor and discriminant analyses in order to seek out predictors of future OPAC use. These analyses defined two distinct groups of respondents: the "reluctant OPAC user" and the "naive OPAC enthusiast."

INTRODUCTION

The uncritical acceptance of the various forms of electronic media in the last ten years has been a feature of libraries as well as the wider society. Where we have concentrated on the specific application of technology, our enthusiasm for it may have blinded us to user reactions to the technology in general.

James Adams of Stanford University's School of Engineering highlighted the dilemma facing society today with respect to computers:

> We will no doubt be subjected to continued fear of technology because of the resulting uncertainty and danger. We will also probably become increasingly dependent upon technology. A Society split into practitioners of technology who are ignorant of human concerns and non-practitioners who are ignorant of technology can only result in a hazardous and unpleasant future.[1]

The paradox of fear or distrust coexisting with increasing dependence is a dimension of technological change that needs to be closely examined.

This view finds research support in seminal studies such as Lee's, which set out to examine popular beliefs and attitudes toward the "electronic computer." Lee found two independent belief-attitudes toward the computer through a series of Likert-scale questions. The first viewed the computer as an instrument of human purposes, while the second portrayed it as a relatively autonomous entity.[2]

Lee's study was replicated in Australia by Morrison in 1983 with a sample of students at the University of New England. Morrison indicated that his findings differed from Lee's and that "the largest amount of variance is explained not by the 'beneficial tool' factor as in Lee's study but by a factor representing negative attitudes toward the possible disemploying and dehumanising effects of computers and fears for their reliability and power over the lives of individuals."[3]

Zoltan and Chapanis undertook a study

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in 1982 to investigate the attitude of professional groups in Baltimore toward computers. A number of factors were represented in an analysis of the data from the sixty-four-item questionnaire distributed to these accountants, lawyers, pharmacists, and physicians. Factor one bore a close resemblance to Lee's "beneficial tool of man" perspective; factor two was seen as accounting for the dehumanizing, depersonalizing, impersonal, cold, and unforgiving effects of computers. The remaining factors displayed positive attitudes.[4]

The literature examining the introduction and acceptance of the Online Public Access Catalog (OPAC) in libraries has been wide and detailed. Many aspects of OPAC have been discussed, but no attention has been paid to an emerging literature assessing attitudes toward technology and its potential impact on OPAC.

The earlier (1981–2) exploratory studies of Carole Weiss Moore, Pritchard, Pawley, and Norden and Lawrence, all contributed to our understanding of OPAC acceptance.[5] But the studies sponsored by the Council on Library Resources, Inc., (CLR) provided the major research thrust in OPAC study.[6] The CLR research found that over 90 percent of users thought the OPAC systems to be acceptable and that nonusers liked it almost as much. One of the goals of the present study was to investigate those factors that affect user acceptance of OPAC systems. Previous studies have concentrated on evaluating attitudes toward specific computer systems rather than the computer technology. It has been previously assumed that acceptance of the specific technology implies acceptance of the technology in general.

BASIS OF THIS STUDY

With the introduction of OPAC (with VTLS software) to the Dixson Library, University of New England (New South Wales, Australia) in March 1984, a questionnaire was established to examine not only user reaction to the VTLS system but also attitudes toward computer technology. The survey questionnaire was administered online, on the same terminal as the catalog software. Each of the questions assessing attitudes toward technology was scored on a Likert scale. The survey data were collected over a period of three weeks in April and attracted 271 valid sets of responses. Each user of the online catalog was invited to respond to the questionnaire, which they were able to access upon entering an appropriate command. Approximately one-third of response sets were eliminated because they were incomplete or had fixed responses (e.g., A,A,A,A). Since reports on the usage of this OPAC installation have been published elsewhere[7,8,9] the aim of the present paper is to relate both positive and negative attitudes toward computer technology in general to acceptance and evaluation of the specific technology of the VTLS OPAC.

Some fifteen questions in the forty-eight-item questionnaire elicited attitudes toward technology:

1. Computers are so amazing that they stagger your imagination.
2. There's something exciting and fascinating about electronic brain machines.
3. These machines can make important decisions better than people.
4. Computers will free people to do more interesting and imaginative work.
5. They are very important to the "man-in-space" program.
6. Computers can make serious mistakes because they fail to take the human factor into account.
7. They can be used for evil purposes if they fall into the wrong hands.
8. There is no limit to what these computers can do.
9. They will help bring about a better way of life for the average person.
10. With these machines, the individual person will not count for very much anymore.
11. Books offer more opportunity than do computers for creative involvement.
12. In the library computer, records are more reliable than card/microfiche records.
13. Computer systems constantly refuse to trust their users.
14. Computer systems are programmed to act as if they always know what is best.
15. Computers have their own minds,

which the user is powerless to alter.

These questions had been drawn from the seminal study by Lee[10] and also from the research by Marvin and Winther.[11] The remainder of the questions assessed various aspects of the OPAC.

RESULTS AND DISCUSSION

Attitudes Toward Technology

The questions about attitude toward technology were submitted to factor analysis to assess the extent of positive and negative attitudes toward computer technology. Using the varimax rotation method, a factor analysis was performed with the specification of two output factors. Only those items having factor loadings with a value greater than .30 were treated as being significant.

The factor explaining the largest percentage of variance (17.9 percent—factor 1—showed characteristics of distrust of computer technology. As the factor loadings in table 1 show, elements of this distrust were that "computers refuse to trust their users; computers are programmed to always know what is best; computers have their own minds, which the user is powerless to alter; and computers make serious mistakes because they fail to take the human factor into account." Factor 2, explaining 13.9 percent of the variance, displayed characteristics of positive acceptance of the technology. This was expressed in attitudes such as: "computers will bring about a better life for the average person; computers will free people to do more interesting and imaginative work; there is something exciting about electronic brain machines; and computers are so amazing that they stagger your imagination."

It is important to note that respondents in this study display a wide range of attitudes toward technology, as measured by factor scores. Inspection of "distrust" factor scores, for example, revealed that 46 percent of respondents obtained negative

TABLE 1

FACTOR ANALYSIS OF ATTITUDES TOWARD TECHNOLOGY

Variables	Factor 1 Distrust Factor	Factor 2 Positive Acceptance Factor	Mean	s.d.
14. Computers constantly refuse to trust their users.	0.632	0.065	5.044	1.794
15. Computer systems are programmed to act as if they always know what is best.	0.632	−0.094	4.487	2.058
16. Computers have their own minds, which the user is powerless to alter.	0.614	0.055	5.730	1.867
11. With these machines, the individual will not count for much anymore.	0.607	−0.335	5.509	1.738
7. Computers can make serious mistakes because they fail to take the human factor into account.	0.555	−0.007	4.077	2.227
8. They can be used for evil purposes if they fall into the wrong hands.	0.407	0.051	3.099	1.940
12. Books offer more opportunity than do computers for creative involvement.	0.385	−0.298	3.734	1.886
4. These machines can make important decisions better than people.	0.325	0.318	5.811	1.524
13. In the library computer, records are more reliable than card/microfiche records.	0.168	0.161	2.970	1.798
10. They will bring about a better way of life for the average person.	−0.320	0.626	3.221	1.691
5. Computers will free people to do more interesting and imaginative work.	−0.199	0.615	2.664	1.695
3. There's something exciting and fascinating about electronic brain machines.	0.052	0.613	3.188	1.765
2. Computers are so amazing that they stagger your imagination.	0.277	0.567	4.011	2.057
9. There is no limit to what these computers can do.	0.320	0.484	5.416	1.899
6. They are very important to the "man-in-space" program.	−0.073	0.280	1.778	1.218
Eigenvalues	2.678	2.088		
Percent of variance	17.9	13.9		

factor scores. Moreover, 19 percent of respondents' distrust factor scores were greater than −1, and 18 percent were greater than +1. It is therefore clear that distrust attitudes were reasonably normally distributed in the present sample. It is particularly ironic that such widely varying attitudes toward technology were displayed by the same respondents who also recorded a high, 95.6 percent acceptance of the OPAC. This contrasting evidence is a matter of great concern for those involved in the introduction of new technologies such as the OPAC. Concentration in the literature has been exclusively on the acceptance of the software with little or no attention being paid to the technology; "the literature of library and information science is still concentrated on the technological ramification of various systems."[12] This survey clearly indicates that both positive and negative attitudes toward technology exist in this survey group.

Predicting Future Usage: The Impact of the Distrust Factor

It was obviously desirable to test further and determine whether there was any relationship between attitudes of technology distrust and future use of the specific OPAC system. To do this the OPAC evaluation data was subjected to discriminant analysis to contrast those who distrusted

TABLE 2

RESULTS OF DISCRIMINANT ANALYSIS OF PAC ACCEPTANCE DIVIDED BY "DISTRUST" ATTITUDES TOWARD TECHNOLOGY

Variables	Group 1 Negative Mean	Group 1 Negative s.d.	Group 2 Positive Mean	Group 2 Positive s.d.	F df(1/32)	P	Standardized Canonical Discriminant Function Coefficient: Reluctant User
17. My first PAC search was looking for (a book, journal, etc.).	2.977	1.876	2.430	1.455	4.879	0.028	0.193
19. My overall attitude to PAC is . . .	1.516	0.708	1.247	0.544	1.560	0.213	0.286
20. How likely are you to use PAC in the future?	1.325	0.703	1.032	0.177	15.19	0.0001	0.441
23. Remembering the correct way to enter a subject search is difficult.	3.269	1.535	3.838	1.393	6.865	0.009	−0.165
24. Remembering search commands in the middle of a search is easy.	2.887	1.274	2.354	1.315	7.691	0.006	0.277
25. Finding the correct subject term is difficult.	2.943	1.456	3.365	1.231	4.463	0.036	−0.124
34. Access to a printer would be a useful feature of PAC.	2.067	1.670	1.580	1.024	5.667	0.018	0.298
39. Which catalog is superior to learn without assistance?	2.786	1.027	3.150	1.062	5.511	0.020	−0.304
41. I use the library (daily, weekly, etc.).	2.370	1.495	2.924	1.758	5.220	0.023	−0.077
42. I would use this PAC (daily, weekly, etc.).	2.044	0.796	1.612	0.692	15.30	0.0001	0.373
43. I use computer terminals other than library's (daily, weekly, etc.).	4.303	1.891	3.526	2.003	7.216	0.007	0.259
45. My age group is . . .	2.415	1.286	2.858	1.125	5.586	0.019	−0.335
46. My sex is . . .	1.393	0.491	1.258	0.439	3.832	0.051	0.168
18. My first search was satisfactory, etc.	1.887	1.081	1.688	1.073	1.560	0.213	−0.275
26. Understanding the HELP screen is difficult.	3.797	1.478	3.892	1.330	0.206	0.649	0.235
30. Limiting search by language.	3.662	1.864	3.666	1.952	0.0001	0.989	−0.278
38. Which catalog is superior for finding books on a topic?	3.561	0.582	3.645	0.775	0.477	0.490	0.218

Scoring Key:
17: Scores are not in a continuum.
23, 24, 25, 26, 30, 34: Low score = agree/helpful; High score = disagree/unhelpful.
38, 39: Low score = care/microfiche superior; High score = PAC superior.
18, 19, 20, 41, 42, 43: Low score = more use; High score = less use.
45: Low scores = younger; High score = older.
48: Low score = arts and humanities; High score = economics/accounting.

the computer technology (group 1—top one-third of factor 1 output scores) with those who positively accepted the computer technology (group 2—bottom one-third of factor 2 output scores), in order to determine whether these attitudes could predict future OPAC usage.

Table 2 summarizes the results of this discriminant functions analysis. Looking at those variables that are most important in discriminating between high- and low-distrust groups (variables with standardized canonical discriminant function coefficients greater than .25), the analysis indicates that those who distrust and are suspicious of the computer technology would have less use for the OPAC in the future (question 20); find difficulty in remembering search commands (question 24); not use the OPAC on every visit to the library (question 42); use other computer terminals quite infrequently (question 43); and are generally in the older group (question 45). Ironically, they see the OPAC as being easier to learn without assistance (question 39). This discriminant function has been characterized as being one of the "reluctant OPAC user."

Conversely, those who had a positive acceptance of computer technology could be expected to display a different attitude toward the OPAC. Again, the OPAC evaluation data were subjected to discriminant analysis in order to contrast those who *did* have a positive acceptance of the technology (group 1—top one-third of factor 2 output scores) with those who *did not* (group 2—bottom one-third of factor 2 output scores). Table 3 reveals that those with a positive acceptance of the technology find the use of Boolean search logic to be helpful (question 33); are more frequent

TABLE 3

RESULTS OF DISCRIMINANT ANALYSIS OF PAC ACCEPTANCE DIVIDED BY "POSITIVE ACCEPTANCE" ATTITUDES

Variables	Group 1 Negative Mean	Group 1 Negative s.d.	Group 2 Positive Mean	Group 2 Positive s.d.	F df(1/26)	P	Standardized Canonical Discriminant Function Coefficient: Naive PAC Enthusiast
27. Searching by words in a title useful	2.122	1.520	2.849	1.933	7.967	0.005	0.083
28. Searching by words in a subject heading is useful.	1.933	1.330	2.720	1.843	10.90	0.001	−0.235
26. Understanding HELP screen is difficult.	3.755	1.424	3.655	0.773	1.091	0.297	0.218
29. Limiting search results by publication date.	2.822	1.686	3.505	1.827	6.894	0.009	−0.158
30. Limiting search results by language.	3.266	1.871	3.903	1.900	5.211	0.023	−0.108
32. Ability to search a book's table of contents would be a useful feature.	1.533	1.182	1.946	1.513	4.211	0.041	0.175
33. Ability to use Boolean search logic would be a useful feature.	3.088	1.981	3.903	2.048	7.465	0.006	−0.284
35. Which catalog is superior in terms of speed?	3.766	0.654	3.655	0.773	1.091	0.297	0.218
39. Which catalog is superior for learning without assistance?	2.933	1.014	3.053	1.035	0.630	0.428	0.290
40. Which catalog is superior for preparing a comprehensive bibliography?	3.655	0.721	3.408	0.837	4.557	0.034	0.224
41. I use the library. . .	3.022	1.767	2.344	1.463	8.016	0.005	0.327
42. I would use this PAC. . .	1.688	0.713	1.924	0.769	4.616	0.033	−0.145
45. My age group is. . .	2.844	1.226	2.473	1.079	4.736	0.030	0.323
46. My subject area of study is. . .	3.044	1.871	2.096	1.429	14.87	0.0002	0.647

Scoring Key:
26, 27, 28, 29, 30, 32, 33: Low scores = agree/helpful; High score-disagree/unhelpful.
35, 39, 40: Low score-card/microfiche superior; High score = PAC superior.
41, 42: Low score = more use; High score = less use.
45: Low score = younger; High score = older.
46: Low score = arts; High score = economics.

users of the library (question 41); are in the younger age group (question 45); and are students of arts and humanities (question 46), yet they find the card or microfiche catalogs easier to learn without assistance (question 39). This classification can be characterised as the "naive" OPAC enthusiast."

CONCLUSION

It is clear from the study that although library users, at one level, can give a specific technology a very high acceptance, the same users can, at another level, exhibit contrasting attitudes toward computer technology in general. This view of new computer technology has not been subject to intense investigation and yet may have far-reaching implications for library managers and practitioners.

These attitudes of distrust and positive acceptance can be predictors of acceptance and future usage of OPACs. The "reluctant OPAC user" needs to be more closely understood. Computer literacy programs need to be closely examined if OPAC success is to be assured in the long term.

For different reasons, a similar solution or approach may be applied to the "naive OPAC enthusiast" who is keen on the medium but has yet to realize the actual capabilities of the OPAC.

Adams[13] clearly sees that unless we are careful, users could become increasingly suspicious of the technology while becoming more dependent on it. These dimensions are evident in the present research and demand close attention in order to consolidate OPAC's place in the modern academic library.

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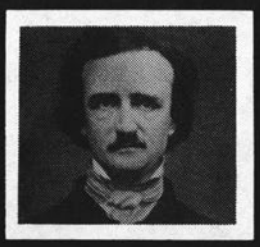

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Letters

To the Editor:

I have just read with interest your and Mary Jo Rudd's article on "Coping with information load" in the July 1986 issue of *College & Research Libraries*.

My disagreement is not with the thrust of your article but with a statement that you twice make as an example. On page 318 you mention Stephen Stoan's (Stephen K. Stoan, "Research and library skills: an analysis and interpretation", *College & Research Libraries*, 45:99–109 (March 1984) discussion of "several library classification and storage policies that have unintended consequences for user information, information acquisition, and pro cessing efficiency." The next sentence reads: "The classification of journals, for example, makes browsing of *related* journals for information a much more time-consuming task." [Emphasis mine]

Related in what way? If by similarity of content, then surely a classification scheme which brings history journals together and separates them from physics journals will do more to facilitate browsing of *related* journals than will the chance collocation of titles imposed by the alphabet. My own library, that of the State University of New York at Buffalo, arranges its periodicals in alphabetical order so that the following journals are shelved together: *The American Journal of Computational Linguistics, The American Journal of Correction, The American Journal of Economics and Sociology, The American Journal of Education,* and *The American Journal of Human Genetics*. While it is possible that the penologist and the sociologist might find matter of interest in each other's journal, the probability of a community of interest is somewhat lower for the linquist and the penologist, not to mention the geneticist.

How are browsers served when a journal changes its title (a habit that too many are prone to have) so that different volumes are separated on the shelves? With classification, all volumes would be brought together no matter how much the name changed.

Later in the article you re-iterate your point, again using it as an example: "Librarians must be cautious, Stoan warns, to avoid making changes in library policy that might hinder the research process; e.g., arranging journals by classification largely eliminates browsing." This time the implication is very clear that the example comes from the Stoan article, as in fact it does although Stoan does not refer to "related" journals. His words are: "A related and less obvious library policy that can arouse resentment is the classification of journals, which substantially eliminates browsing on the assumption that no one would look at a journal without first consulting an index." (Stoan, p.108)

It is the idea, not its source, with which I disagree, though I think that your insertion of the word 'related' weakens your point that classification of journals hinders browsing.

I recently surveyed the ARL libraries to determine their arrangement of periodicals. Some 85% of those responding classified either their entire or at least the larger part of their collection of periodicals. None of them planned to declassify while some of the non-classifiers were considering classifying all or parts of their collections. The mere fact that so many libraries classify periodicals does not, of course, make it a good policy; however, it does raise the possibility that such an approach does have value, either for efficient management of the library as an institution or for the users it serves or both.

JUDITH HOPKINS
University at Buffalo, New York

To the Editor:

This letter is a response to Judith B. Barnett's recent letter regarding the article "T is for Temporary" which appeared in the July 1986 issue of *College and Research Libraries*. Ms. Barnett states the AAUP, American Association of University Professors, "publishes detailed statistics on academic personnel, including part-time and temporary positions." My co-author, Cecilia Rothschild, and I did examine articles from the AAUP journal *Academe* during our research, but, while the articles did mention figures on temporary or part-time *teaching* faculty, statistics on librarians—the point we addressed in our discussion—were not provided. In fact, "librarians have specifically been excluded for the purpose of the survey (Annual AAUP Survey of Faculty Compensation) which is to collect information on instructional staff," according to Maryse Eymonerie, an AAUP consultant who has compiled the survey since it began in 1958/59. Iris Molotski of the AAUP Washington office also stated the AAUP keeps no statistics by discipline for any faculty group.

Ms. Rothschild and I are presently investigating the content of the "National Faculty Survey" compiled by Appalachian State University and Oklahoma State University's "Faculty Salary Survey by Discipline" for any pertinent statistics. We are not, however, optimistic that these sources will contain data on academic librarians whether employed in permanent or temporary positions. We reassert our conclusion that temporary librarians "constitute an unrecognized segment of the professional library workforce." As stated in our article, we are pursuing the topic; our survey of all California college and university libraries will be distributed this fall.

DONNA ZUFAN PONTAU
San Jose State University

To the Editor:

The recent exchange of correspondence between Mssrs. Hill and Hamptman and Ms. List (July 1986) reminds many librarians of the faculty status debate that virtually raged about a dozen years ago. While this issue had somewhat disappeared from the literature, the fact that the exchange took place demands a response. In none of the definitions I could locate did the term librarian appear in defining faculty. Interestingly enough, neither did historian, biologist, or engineer. Historically, the term means one who teaches. My concern is not whether the librarian does nor does not have faculty status, nor what faculty status entails. My point is that being a faculty member ignores your academic discipline—a faculty member is just that. What's more, at more and more institutions the decision on faculty status rests with university, not library administrators. So the idea of "real faculty" is often not an issue at all. After all, when I see a faculty member I fail to see signage which designates chemist or economist or librarian.

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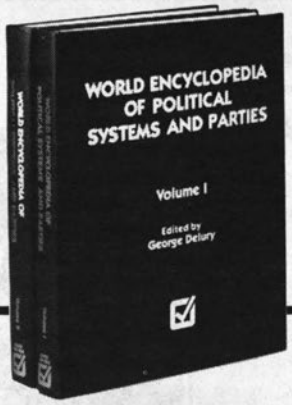

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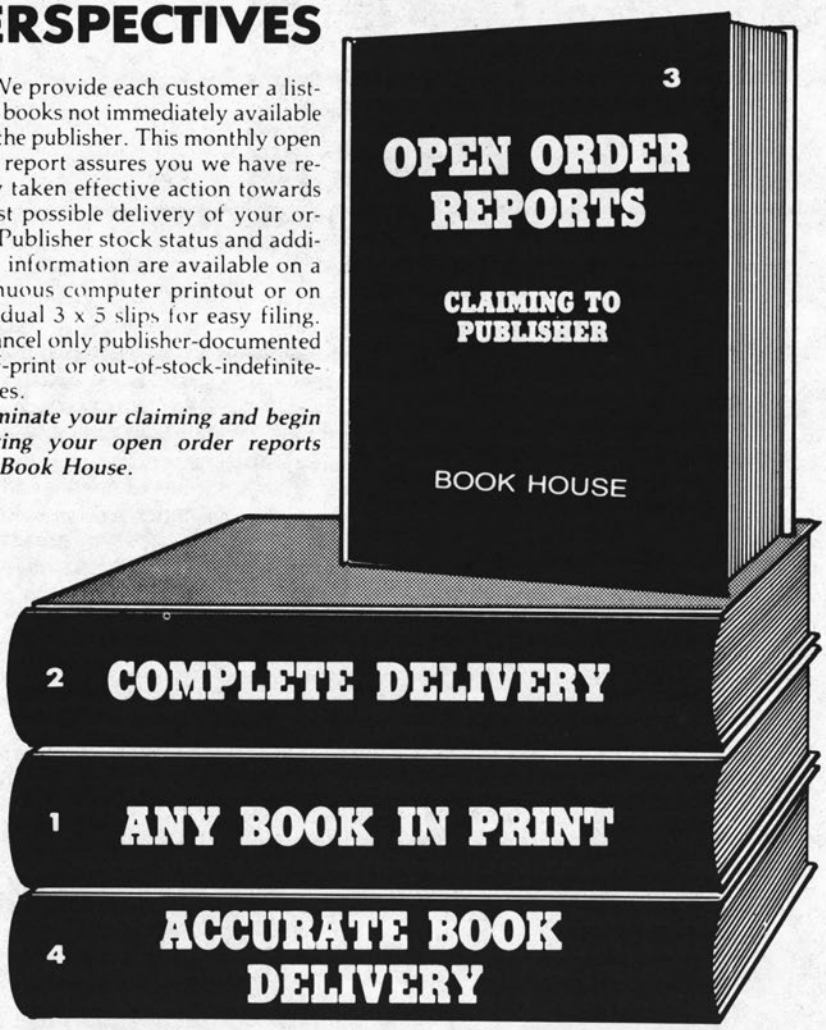

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BOOK REVIEWS

Universities, Information Technology, and Academic Libraries: The Next Twenty Years. Academic Libraries Frontiers Conference, UCLA, Lake Arrowhead Conference Center, December 13–17, 1981. Robert M. Hayes, ed. Norwood, N.J.: Ablex, 1986. 178p. $29.95. LC 85-22879. ISBN 0-89391-266-2.

The conference from which this book is derived was organized by the editor, who is dean of UCLA's library school, with support from the Council on Library Resources. It brought together approximately forty-five selected participants (academic research library directors, library school deans, university administrators, representatives of library consortia and associations, and sponsors of library development programs) to consider the future of universities and their research libraries through the remainder of this century and to deliberate on the needs for research on academic librarianship and for education for management of academic research libraries.

What this book can offer the potential reader is substantial, but probably a good deal less than its title might suggest. Since everything in it is five years old, this is hardly a preferred source of material on the status of developments in information technology, academic libraries, or universities. And, since the title's indicated concern for "the next twenty years" is respected only sketchily and unevenly in the text, a reader would search in vain for some conference product that tabulates chronologically the major developments to be anticipated in academic research libraries through the end of the century.

Indeed, one will find barely any conference product at all here. The book is primarily an assemblage of material describing the background and conduct of the conference that is sandwiched in with the texts of background talks, which were delivered by six distinguished, invited speakers for the purpose of stimulating deliberation by conference participants. Also, the editor has tabulated and characterized the various issues that were uppermost in the participants' minds, as reflected in the personal lists of five main issues that each attendee was asked to bring to the conference.

The meager product of the discussion sessions takes up only seven pages in the final chapter. It consists of two groups of statements prescribing educational objectives to be met and research tasks to be undertaken in connection with academic librarianship. The educational objectives are familiar ones relating to technology, management, academic environment, and fundamentals of librarianship; input from other disciplines; recruitment of superior students; and continuing education. The thirty-nine research tasks are presented without any intrinsic or accompanying explanation of why they are particularly timely or what purposes they will serve. These tasks are stated so broadly that, as guides to action, they are sterile. For example: "Identify how information needs are currently being met in the university, and project what means are likely to be used in the future." Or: "Carry out parallel studies of librarians' attitudes and perceptions of faculty." Although the transcripts from the closing session make plain that at least some of the conferees were euphoric about new insights gained,

the product presented here seems to show that the doctors and saints of this event, like Omar of yore, went out by the same door where in they went.

Nevertheless, there is plenty of worthwhile reading in this book for academic librarians who take their profession seriously. The six background papers that fill most of the pages provide, collectively, a treasure of carefully considered, even inspired, organization and interpretation of information bearing on the future of universities and their libraries. The papers are by three university presidents: William Gerberding (University of Washington); John Brademas (New York University); and Steven Muller (Johns Hopkins University) and three vice-presidents: Gerald Stevens (Yale); William Schaefer (UCLA); and Howard Resnikoff (Harvard). Their presentations overlap in scope, but they focus on different aspects of the outlook for universities: economic and political environments, future student population, information technologies and their impacts, and prospects for academic programs and organizational structures.

The panorama suggested by this group of presentations is one in which we will see universities adapting, perforce and clumsily, to: continuing technological and social revolution, fairly static instructional volume and older students, proportionally more foreign students, uneven progress in accommodation of minorities, unlikely restoration of generous government support for students or institutions, growing demand for vocational instruction, shrinkage in areas of liberal arts and social science, aging faculties, competition from commercial providers of vocationally oriented instruction, increased cooperation with industry as a way of securing support, increased conflict of interest between faculty and institution, and slowed growth of basic scholarship and research. Universities will need to revise dramatically their instructional methods and adapt their organizational structures in order to coordinate broad information activities based on technology. Academic libraries, if they are perceptive and adaptable, can avoid sliding into irrelevance by becoming the multifaceted information hub of the emerging university. These prospects, and what can be done about them by universities and libraries, are elaborated to different degrees in the several papers.

So far, in the passage of time since original presentation of these papers, no important surprises or omissions have turned up to diminish the authors' credibility. Their insights are of the kind that trigger creative thinking about useful courses of action for education and academic librarianship.

Readers must depend on their own ingenuity for integrating related passages from the several papers. Expect no help from the subject index, which is vapid and usually fails to link discussions of similar concepts when the speakers used different phraseology or contexts, but the name index could conceivably help some readers.—*Ben-Ami Lipetz, School of Information Science and Policy, State University of New York at Albany.*

International Librarianship Today and Tomorrow: A Festschrift for William J. Welsh. Comp. by Joseph W. Price and Mary S. Price. New York: K.G. Saur, 1985. 174p. $32.50. ISBN 3-598-10586-X.

In his preface to *Index to Festschriften in Librarianship,* J. Periam Danton characterizes festschriften and provides the basis on which to judge this genre. A festschrift is meant to honor "a more or less distinguished individual" with a volume of contributions "by the honoree's friends and colleagues who are also usually prominent in their fields," and to have lasting significance. A biography of the honoree is usually present; a bibliography of his or her work is always present. Danton adds, however: "In the field of librarianship, at least, there is a considerable number of works in which both are lacking. Indeed in a few Festschriften there is no indication whatever, either on the title page or in the preface, introduction, dedication, foreword, text, or appendix—of who the honoree is, where he was active, or in what field!"

The compilers of this volume have not

been quite so neglectful, but readers must look elsewhere for both a biography and a bibliography. This is a pity, because William F. Welsh's career at the Library of Congress, which now spans thirty-nine years and is far from over, is incomparable in the annals of American librarianship for its impact and vision. One or the other would have added to the lasting qualities of this volume.

In 1970 Danton lamented the absence of bibliographic control accorded festschriften and the resulting obscurity of the contributions. Practice has not changed. Unfortunately, only the few serendipitously blessed will be able to find the provocative and stimulating thoughts embedded in this volume, thoughts contributed by some of the most eminent and distinguished practitioners of and thinkers about international librarianship, whose life work is dedicated to making knowledge accessible. William O. Baker, of AT&T Bell Laboratories, observes that the information age is unlike previous "ages" that were rooted in natural phenomena, all of which exist independently of humankind. Products of the information age, in contrast, are artifacts of the human brain and only partly, if at all, derived from natural phenomena (p.9). Martin M. Cummings, director emeritus of the National Library of Medicine, concludes that "The Library of the future should serve as the principal node in the information systems of universities" (p.40). Franz George Kaltwasser provides an absorbing perspective on the development of German libraries and points out the contrasting national library philosophies. The Library of Congress, for example, allows individuals unhindered admission but is basically a library of reference only. European libraries, on the other hand, restrict admission but lend their materials freely. In Germany, the lack of a national library and the existence of a liberal interlibrary loan policy led to the planning and development of union catalogs that were to compensate for the lack of a national library. Hermann Liebaers' overview of European research libraries is written with insight and charm. Some contributions, such as Elsa Granheim's "Special Problems of Libraries Serving a Linguistic Minority: The Norwegian Experience," may appear too specialized but do present genuinely interesting and thought-provoking problems.

The view of international librarianship presented in this volume, perhaps not surprisingly considering the nature of the genre, favors developed countries, English-speaking countries, and western European countries. The exceptions are Kenya and the USSR. Most of Africa, and all of South America, Asia, and the Indian subcontinent are absent. Also, the past and the present loom larger than the future in the majority of the papers. A more accurate title might have been "Aspects of International Librarianship Today and Day After Tomorrow."

The compilers might have taken more care. How can it be that we who spend so much time describing books do so poorly at making them? Copy editing might have been better. The typos are many, but have

a certain international flavor: "about 66% of the total working populations ist doing information handling services" (p.13); and "National Library of Medecine" (p.108). An index would have been useful. And so would a foreword acknowledging the fifteen contributors by title and providing some context about the preparation of this work. The book was presented to Welsh at a special reception sponsored by the publisher, K. G. Saur, during the Fifty-first Council and General Conference of the International Federation of Library Associations and Institutions (IFLA) in August 1985. Was this festschrift prepared especially for this event?

Honoring Bill Welsh requires no justification, of course. The wonder is that honor isn't done more often. His achievements should be more widely acknowledged and appreciated outside library circles. This book is a fine tribute.—*Nina W. Matheson, William H. Welch Medical Library, Johns Hopkins University, Baltimore, Maryland.*

Harman, Keith and Charles R. McClure. *Strategic Planning for Sponsored Project Administration: The Role of Information Management*. Westport, Conn.: Greenwood, 1985. 279p. $45. LC 85-9881. ISBN 0-813-24931-8.

This is another quality and timely product of the prolific McClure publication factory. The team of Keith Harman, director of the Office of Educational Grants at Southeast Missouri State University, and Charles McClure, associate professor in the School of Library Science at the University of Oklahoma, has produced a "theoretical treatise and a desktop handbook" to assist sponsored-project administrators in their understanding and use of strategic planning and information management techniques.

As the premier volume in the new Greenwood Press series, Emerging Patterns of Work and Communications in an Information Age, the work focuses on establishing a conceptual framework for core organizational and management concepts—systems theory, strategic planning, boundary spanning, organizational culture, contingency management, organizational role and information management—and on outlining the key elements of the strategic planning process and of decision support systems. What distinguishes this treatment of these now very familiar concepts and techniques is the effective and essential link drawn between information resources management and strategic planning and the focus on administrators working with grants, contracts, and cooperative agreements supporting research and development projects.

The authors recognize that significant changes are taking place in the grants environment, as the interests and support levels of federal agencies, foundations, and corporations shift dramatically. They also note that the role of the project administrator in many organizations has expanded from management of single projects to organization-wide responsibility for sponsored-project performance. These developments demand new approaches and the promotion of a "planning culture" characterized by effective information identification, acquisition, organization, evaluation, and dissemination.

The central premises are summarized early in the volume, on page 52: "through a decision support system, sponsored project administrators may arrange and interrelate the information-processing mechanisms and tools needed to provide timely, valid and reliable information. . . . Boundary spanning offers a means by which sponsored projects administrators may communicate relevant information regarding sponsored projects to key clients (funders), constituents (organization decision makers), support staff/units, and project personnel. Contingency management provides an administrative posture which emphasizes a situational or adaptive approach. Strategic planning serves as the fulcrum or transforming agent by producing ongoing plans which help identify those environmental factors, organizational resources, problems, and opportunities most relevant to the organization's sponsored projects effort."

Subsequent chapters provide detailed discussions and prescriptive information about these concepts and their underlying

assumptions and components. Readers are effectively marched through the fundamental steps in the strategic planning process: analysis of environment, identification of strategies, formulation of action plans, construction of objectives, generation of goals, review of strategies, creation of "early warning system" to monitor progress, implementation of action plans, adjustment of plans as required, and recycling of planning process. The reader will appreciate this well-organized and clear presentation of strategic planning and its focus on the effectiveness of the monitoring, measuring, and communication devices. The reviewer was particularly intrigued by the concept of MBWA—Management by Walking (or Wandering) Around. The presentation would have been improved by expanding attention to the relationship between the planning and budget processes and by discussing the need for organizationwide commitment to the planning effort.

The chapter on the relationship of information resources management and decision support systems to strategic planning is crucial to the book's thesis. A well-designed information system provides an empirical basis for planning and decision making; presents intelligence about the environment; encourages assessment of historical, current, and future conditions; and permits evaluation of the planning process and monitoring of progress. The important role of online database services and the institution's library in supporting access to information resources is cited. The general principles advocated for effective information management systems—integration, interaction, flexibility, and needs orientation—will be familiar to librarian readers.

Harman and McClure have provided a well-organized and -documented study. The literatures of organizational theory, planning, information management, and sponsored-project administration are effectively integrated. Graphics, charts, and tables are used liberally to present complex ideas and synthesize research findings, and each chapter is clearly organized and concluded with a well-written summary of the key concepts. The most significant weakness of the work and perhaps, in my view, its greatest strength is the seeming focus on sponsored-project administration, as indicated in the title. Some potential readers will thus not be attracted to the volume, although much of the material would be of value to a broad audience. One could read the book, freely substituting a host of professions for the sponsored-project administrator. The authors conclude that "people are the organization and information is the most critical resource at their disposal." Haven't librarians been advocating these ideas for years?—*James G. Neal, Pennsylvania State University Libraries, University Park.*

Keaveney, Sydney Starr. *Contemporary Art Documentation and Fine Arts Libraries.* Metuchen, N.J.: Scarecrow, 1986. 181p. $17.50. LC 85-22234. ISBN 0-8108-1859-0.

A Reader in Art Librarianship. Ed. by Philip Pacey for the Section of Art Libraries. IFLA Publications, no. 34. München: K.G. Saur, 1985. 199p. $20 ISBN 3-598-20398-5.

The examination of the information flow in the contemporary art world and the impact of the resulting interrelationships on library collecting patterns is an adaptation of Keaveney's doctoral thesis. After reviewing information science techniques for measuring the flow of information in other fields and applying them to the art world, she tested her assumptions against the survey results on library holdings of a set of contemporary artists. She also interviewed a number of artists and others in the art world to determine patterns of communication and the placement of "gatekeepers" on the path of information as it flows from the artists to society at large.

Keaveney selected forty contemporary American artists and analyzed the holdings of fourteen New York City–area art libraries (five museum libraries, five academic libraries, and four public libraries), checking holdings in both card catalogs and vertical files but not in periodical files or indexes. Additionally, she checked several major bibliographic sources, including the database of the Research Libraries In-

formation Network (RLIN). The searches through the fourteen libraries and the additional bibliographic resources enabled Keaveney to compile a list of 688 titles on her selected artists.

The expected findings were that the art libraries would hold information about the artists in direct proportion to their fame and that largely the same material would be held by all the libraries. Further, it was expected that monographs, which may be acquired through normal bibliographic channels, would be in all libraries, with other types of materials, exhibition catalogs and ephemera, held in inverse proportions to their numbers. Instead, Keaveney found that when the holdings of the individual libraries were compared to the ideal list, the highest percentage of the 688 was 69 percent, and most libraries held less than 25 percent. Other findings include a lack of overlap, with "unique" items found in thirteen of the fourteen libraries and a striking 60 percent found in only one of the libraries. Monographs were held evenly across the libraries, though most held only about half of those available. For exhibition catalogs, the holdings were less evenly distributed, with greater incidence of uniqueness, perhaps reflecting difficulties in acquisition and cataloging. The two sources checked for coverage in the bibliographic mainstream—*Books in Print* and *Art Books, 1950–1979*—included 6.5 percent and 2 percent, respectively, of the 688 titles.

The examination of the vertical files of ephemeral material yielded up a larger number of items, the number of pieces a library held on the forty artists ranging from 1,423 to a mere 18. Museum libraries hold, on average, the largest number of items per artist and academic libraries, the least. There was no attempt to do an overlap study or comprehensive checklist to check completeness of holdings because of differing policies regarding the materials. For example, while artist monographs were usually cataloged, exhibition catalogs, even major ones, might be held in vertical files. Conversely, some libraries cataloged even slim dealer catalogs and indexed, in the card catalog, significant entries in a monograph or periodical articles.

As a bibliometric study, this research is only technically interesting. The work becomes significant, however, when examining or defending a library's collection development, processing, or preservation policies. For example, if a library collects only those materials cited in standard bibliographic sources, a significant research collection may not be developed because the key documents for an art movement may be the dealers' announcements of group shows. Further, the low overlap, even across the readily available monographs, suggests that interlibrary loan arrangements, coupled with cooperative collection development, may prove to be critical in enabling researchers to consult the full range of available materials on an artist or movement.

The real significance of this study, though, lies with the analysis of the various vertical file holdings and the diversity and uniqueness of the materials found there. The art world is concerned with visual images, and this documentation includes books and periodicals, plus representations of the art itself, often in ephemeral form: postcards, reproductions, exhibition checklists, and banners. For lesser-known or emerging artists these ephemera may be the only documentation of their works, yet they present difficulties in acquisitions, cataloging, and storage for libraries, and their collection, even by major art libraries, will reflect the judgments made by the larger art world. That is, ephemera on better-known artists, or from more influential galleries, will be more likely to be acquired and retained. Too many art libraries have had to abandon their vertical files due to expense, although the files tend to continue to exist in museum libraries.

In the history of art libraries, vertical files and various forms of periodical indexing arose to fill the same need: access to published information outside of books. A combination of technology, commercial efforts, and cooperation has made periodical indexes available for most areas of artistic endeavor. Vertical files have languished—though the best have been destroyed through overuse. If the information traditionally contained in such files is valuable, and Keaveney's work suggests that it might be, then can technology, commercial efforts, and cooperation be harnessed again for its preservation and dissemination?

Cavils include failure to define until late in the book the word *monograph,* which has a very specific meaning in an art-library context, and the review of the findings in the RLIN database. The searching of the RLIN database in 1981 was performed in the early stages of RLIN's development as an art information database, when most of the major art libraries that now contribute bibliographic data were just getting started as participants and archival tapes were as yet unloaded. It would have been useful, in preparing this edition of the study, to have repeated the RLIN searches now that RLIN has matured as an art bibliographic database.

The collection of essays, edited by Philip Pacey—who until the IFLA meetings in 1985 was chair of its Section of Art Libraries—was not prepared about the "how" of art librarianship but about the "why." And while Pacey is sure of the book's purpose, this reviewer is unsure of its intended audience. As with any compilation, though, part of the publication's value is the bringing together of otherwise hard-to-find, yet timeless, essays. Of the twenty-nine presented here, nine were first published before 1970, and fully half first appeared in British library journals. (A number of the essays were first presented at IFLA meetings).

The book has four main sections: the first examines the history and nature of art librarianship and includes several discussions of the desired characteristics and qualifications of the "compleat art librarian," to use the term contributed by Trevor Fawcett, past chair of the Art Libraries Society (ARLIS.). These essays combine well with the more bureaucratic standards statements from ARLIS and the Art Libraries Society of North America (ARLIS/NA) found in the appendix.

The fourteen essays in the second section describe the art library from the perspective of four classes of users: art historians and curators, artists and art students, designers, and the public. Ex-

cept for students wishing to gain an understanding of the profession of art librarianship, most of the essays in this section serve little purpose other than professional breast-beating. Active art librarians are aware of the range of information needs their users have, though Frances Lichten's essay, written in 1959 from the perspective of a library user, keeps the reader mindful of the obstacles well-meaning librarians can throw up in the path of the researcher.

In the third section, the essayists attempt to analyze the control and retrieval challenges presented by the forms, particularly the visual forms, in which art is documented. For the experienced visual arts librarian, these essays provide the most to ponder. Trevor Fawcett examines the subject limits of the art library by looking first at the expanding limits of art itself, concluding that using standard classification schemes to define the art library leads to "arbitrary unions and separations" and proposing an artifact-based scheme instead. In the next essay, written three years later for the International Seminar on Information Problems in Art History (March 1982), Fawcett takes on the inadequacy of classification and subject indexing for retrieval, particularly of images—an inadequacy that the *Art and Architecture Thesaurus* has begun to meet. Wolfgang Freitag picks up Fawcett's concern for access to the visual image in a paper presented at the IFLA meetings in August 1982, "The Indivisibility of Art Librarianship." In this essay he reminds us that in the study of art it is the art object itself that is the primary source of information and that visual representations, whether illustrations in books, reproduction engravings, slides, or videodisc images, are surrogates, as the originals are not always available for study. Yet, to the detriment of researchers, the image and print collections are too often separate, both physically and philosophically.

The final section reviews the movement toward national and international cooperation among art librarians. The first essay, by Freitag (Fogg Art Museum), dates from 1968 and sets forth a plan leading to communication among the art libraries of the world. The final two essays, by William B. Walker (Metropolitan Museum of Art) and Philip Pacey, describe the progress art librarians have made in international cooperation from the perspective of two who were early and influential leaders in those efforts.

Taken individually, several of the essays are delights. The one written in 1908 by Jane Wright, then librarian of the Cincinnati Art Museum, describes why art librarianship was different from other branches at a time when art libraries were growing rapidly and developing, or finding the need for, some of the bibliographical apparatus we now take as standard: indexes of periodical articles and reproductions, such as the *Periodical Index* of the Ryerson Library of the Art Institute of Chicago or the H.W. Wilson Company's *Art Index*; individualized thesauri for local collections, such as the Avery collection at Columbia University; and picture and vertical files whose value has been proven by the subsequent generations of researchers. The essay is full of the joy of having a job in which one feels as if one *can* make a difference.—*Karen Muller, Quality Books, Inc., Lake Bluff, Illinois.*

Library Science Annual. V.1 (1985). Ed. by Bohdan S. Wynar and Heather Cameron. Littleton, Colo.: Libraries Unlimited, 1985. 204p. $37.50. LC 85-650346. ISBN 0-87287-495-8.

Publishers in our field have two choices: to publish significant monographs or self-sustaining reference books. The latter approach is often more time-consuming and expensive than the former. Such publishers, however, count on profits from standing orders and repeat sales as new editions become necessary.

Here, Libraries Unlimited has decided on that latter approach. Apparently they believe that researchers in library and information science generate so much new information each year about their field that others, especially librarians, will find it useful to have an annual compilation that will (1) "review all English-language monographs and reference books in library science published in a year, . . . (2) evaluate all English-language library science period-

icals and indexing services, . . . (3) highlight research trends, . . . [and] (4) report on the production and distribution of knowledge in library science" (p.ix-x).

Divided into four major parts, the editors cover publishing, review monographs as well as periodicals, and abstract 30 of the 102 dissertations completed during 1983. In the first part, original essays by Eric Moon, Norman Stevens, George Bobinski, Danuta Nitecki, and Donald Case focus on Scarecrow Press, the Canadian library press, the history and current state of publishing, an analysis of 105 journals, database reviewing, and the state of information science. In part 2, the monographic reviews are classified into 32 broad areas and read much like those in Libraries Unlimited's *ARBA*, "a companion volume" (p.ix). Part 3 reviews approximately 40 national and subject-oriented periodicals in our field.

Two essays in part 1 stand out: Norman Stevens' insightful overview of our publishing houses and Donald Case's humanistic portrayal of information science. Part 3 lacks reviews for several notable journals including *Library and Information Science Research (LISR), Journal of Library History, Government Publications Review,* and *Government Information Quarterly,* while wasting space on many of the upstart Haworth Press titles. Nevertheless, the lengthy reviews are informative and occasionally include notes and references for further reading. Part 4 duplicates the bibliographical control of dissertations: e.g., UMI publishes a special list of titles in library and information science. And while *LQ* previously listed dissertations, *LISR* has now accepted that responsibility by actually *reviewing* selected titles. Still, Gail Schlachter, the LSA editor of this section, makes such literature more widely known and does provide an abstract focusing on purpose, procedure, and findings for each highlighted dissertation.

To be sure, this volume possesses minor flaws, but more importantly, it signals a landmark advance for library and information science. As the editors suggest in their fifth objective, there is "intellectual activity in librarianship" (p.x). Indeed, our epistemology—the way one knows in our field—is moving from knowledge based solely on firsthand experience to that developed in systematic qualitative and quantitative discovery.—*John Richardson, Jr. Graduate School of Library and Information Science, University of California, Los Angeles.*

Alley, Brian and Jennifer Cargill. *Librarian in Search of a Publisher: How to Get Published.* Phoenix, Ariz.: Oryx, 1986. 172p. $18.50. LC 85-45512 ISBN 0-89774-150-1.

Librarian/Author: A Practical Guide on How to Get Published. Ed by Betty-Carol Sellen. New York: Neal-Schuman, 1985. 247p. $24.95. LC 85-4593 ISBN 0-918212-83-9.

These two books offer practical advice and assistance to the librarian who has decided to write for publication. Ostensibly these how-to books cover the same material: writing and publishing the journal article or the book. The similarity ends there, however, for the tone of these books and their emphases differ greatly.

The Alley/Cargill book serves more as a motivational tool for those individuals who want to write, but have not actually set pen to paper or fingers to keyboard in the case of the highly touted computer. The Sellen book is a collection of essays written by experienced librarians from the writing and publishing sides of this process; it assumes you are already writing and need to know the "whys," "wheres," and "hows" of getting into print.

A cartoon by Barbara G. Scheibling, indicative of the content which follows, begins each chapter of the Alley/Cargill work. Filled with "dos," "don'ts," and "shoulds," page after page takes the would-be librarian/author through the hard questions that must be asked, and answered, if that deeply felt response, carefully researched question or highly successful program is ever going to find its way into the professional literature in the form of a letter to the editor, a presentation at the local chapter of one of the professional associations, a journal article, or a book. The authors encourage you to consider all formats and repeat the old cliché in new words, that the only way to write is

to write.

The underlying assumption is that you want to write and that this book will be your guide through the process, offering the much-needed pep talk at every step of the way and the practical advice to be successful, not only at the writing, but at turning that written piece into a published work. Either at the end of a chapter or interspersed throughout the text, and again at the end of the book, specific works are recommended to assist with each of these steps. To increase their usefulness, the cited works are either succinctly (yet clearly) annotated or discussed by the authors within the text itself.

Several ideas repeat throughout the book and serve in the end as themes: schedule your time and your work efficiently and stick to it; meet your deadlines, whether self-imposed or by contract to an editor or publisher; write and then write some more—every opportunity will help you polish and refine your writing skills, helping you advance up the publishing ladder; computer technology, specifically in the form of word processing, makes the process almost effortless.

There seems to be an idealization, almost a reverence, of technology taking place and an overstatement of the importance of word processing. The new technology is an important tool and very useful for handling some of the mechanics of writing—this review is being composed on a word processor—but there is no magic in the computer that decides which words to put onto the paper or what their order should be; in other words, the creativity remains within the author.

The inclusion of a list of key reviewing sources in the library and information science field; a list of publishers known for publishing bibliographies, along with three sets of guidelines for bibliography series; a sample formal book prospectus; a sample book publishing contract; and a few well-chosen sample author guidelines complete this upbeat, jam-packed guidebook through the inner and outer obstacles to being a published librarian.

Having put to good use all the advice and guidance of Alley and Cargill, you have written the journal article or the

book; now the Sellen book comes into play. There is some discussion of motivation; of what a progression in a librarian/writer's career might be, idealized to some extent by Kathleen Heim; and of manuscript preparation, with useful sources both discussed in the text and referenced at the end of several chapters, as well as an annotated bibliography on where to go for more information on publishing a journal article or book. Yet the majority of this work is given to book publishing with all of its problems and pitfalls and how, with knowledge and forethought, you might avoid them.

Valuable, detailed advice is offered by several of the authors on taking the book from an idea to a finished product: the proposal, how to choose a publisher, the contract, what to expect from an editor, and copyright issues.

Two surveys were undertaken to gather information for inclusion in this work. The first, by Patricia Brauch, covered the book publishers in library and information science; the second, by Ruth Fraley and Barbara Vie, questioned journal publishers in the field.

The Brauch chapter gives an analysis of the questionnaire results and, by means of the publishers' responses, answers some important questions for a potential author in this field. A directory of these publishers is included, along with the survey instrument, at the chapter's conclusion.

The chapter on the survey of journals in library and information science is lengthy, ninety-eight pages, with all but three pages given over to the directory of library and information science journal publishers. Unfortunately, no analysis is given. More than one-third of this $24.95 book consits of lists; although it is extremely handy to have these in one place, they will be in need of continual updating. By way of example, with the move of the Special Libraries Association headquarters to Washington, D.C., *Special Libraries* is no longer published out of New York. The Johnson chapter in this book lists four places where information on library and library-related journals might be found, from the more general *Ulrich's*, updated annually, to the specifically directed work by Stevens and Stevens with a 1982 copyright date.

Special kudos belong to Art Plotnik who, through some well-deserved, humorous finger pointing at the state of professional literature in librarianship, offers some common sense and down-to-earth tips to the writer/librarian. The brief, annotated resource list on library publishing and the general authors' aids at the end of his essay are an added bonus.

The American Library Association's "Guidelines for Authors, Editors and Publishers of Literature in the Library and Information Field" is appended. Capsule autobiographies of the chapter authors are a helpful addition; they enable the reader to know the writers' viewpoints.

Complementary in nature, both books deserve reading by the librarian/author, despite the small overlap. If you have ever considered writing or are stuck somewhere in the process, Alley and Cargill can get you started. Keep it nearby for quick hits of motivation. The Sellen book is more reference-style, and that's where I would keep it—on the reference shelf.—*M. Cecilia Rothschild, Defense Technical Information Center, Alexandria, Virginia.*

Lambert, Jill. *Scientific and Technical Journals*. London: Clive Bingley, 1985. 191p. $19. ISBN 0-85157-375-4.

The intended audience is library and information science students, though the author expected that some portions of the book would have wider appeal. Each chapter highlights developments or key issues of the topic presented. Lambert provides an overview of the history of scientific journal development and growth as well as a description of the different types of primary and secondary journals and publishers. The chapter on problems of journal publication considers such topics as publication delays, proliferation and specialization of titles, economic issues, and copyright questions from the perspective of librarians, publishers, and authors. From the focus on paper journals, Lambert moves to alternative methods of communicating scientific information, such as microform publications, synopses journals, preprints, and electronic journals.

The advantages and problems of each are discussed, examples are given, and the success of such ventures is evaluated. Likewise, a number of electronic document delivery projects are described in detail, along with an evaluation of the feasibility and potential market for such services. As in earlier sections, the viewpoints of scientists, publishers, and librarians are discussed. The approach is practical, not theoretical, and many examples and descriptions of projects are provided. The orientation of most of these is strongly British.

Lambert also provides a section on citation analysis that summarizes major bibliometric theories and studies. Much of this chapter is given over to a description of *Science Citation Index* and studies that have utilized data from that publication. She makes suggestions about the relevance of such work to the functioning library and cautions about generalizing any such studies to a particular library situation.

The final chapter describes development of the CODEN and ISSN serials identifiers. Also included is a good summary of printed identification aids for current and retrospective work, with some details of their coverage, though little mention is made of corresponding online information sources.

Each chapter of *Scientific and Technical Journals* includes an extensive list of references. The index, which was compiled by Peter Perry, works well, though additional entries for complete names, not just their acronyms, would have been helpful. In general, the book is clearly written and accurate, though the synopses journals section becomes repetitious, and the section on computer conferencing is marred by an inaccurate description of synchronous versus asynchronous communication. While this volume will provide little new information to the practicing serials librarian, it would be useful for library school students.—*Jean K. Sheviak, Schaffer Library, Union College, Schenectady, New York.*

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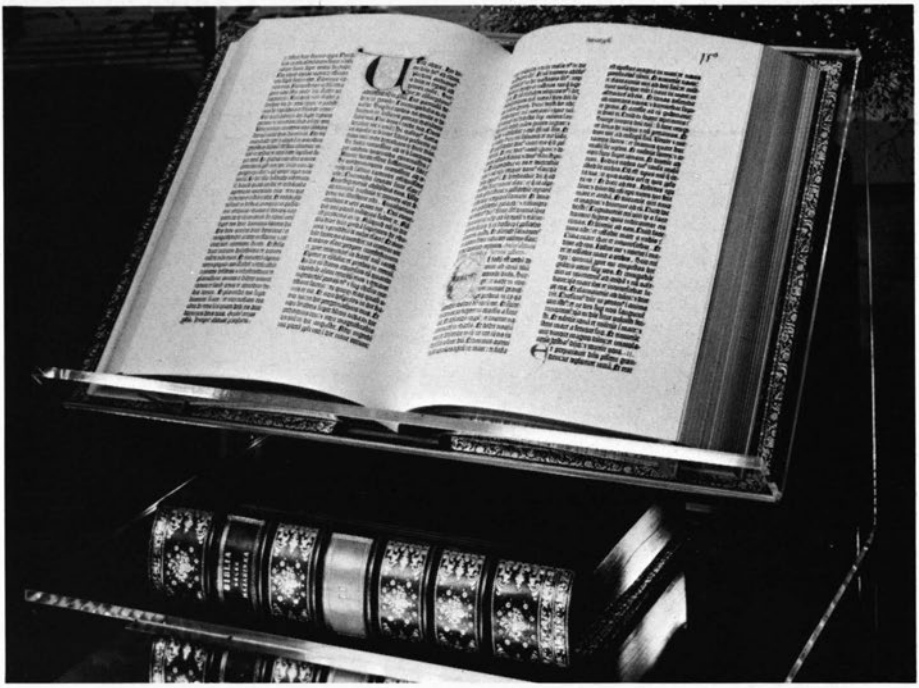

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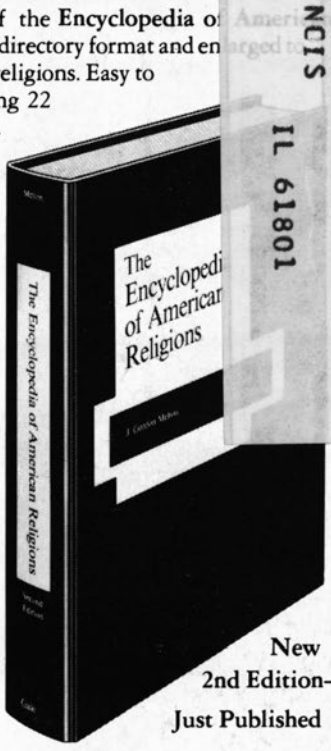

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